

The University of Chicago

RECENT TRENDS IN THE
DEMAND FOR AMERICAN COTTON

A PART OF A DISSERTATION SUBMITTED TO
THE FACULTY OF THE SCHOOL OF BUSINESS
IN CANDIDACY FOR THE DEGREE OF DOCTOR
OF PHILOSOPHY

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By
CYRIL O'DONNELL

Reprinted from
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PREFACE

FROM some points of view, one who investigates the marketing of raw cotton is fortunate in having available a large number of specialized studies in the subject. The statistical basis for these inquiries rests primarily upon the publications of the United States Department of Agriculture, the Bureau of the Census, the Bureau of Foreign and Domestic Commerce, the Bureau of Labor Statistics, the New York Cotton Exchange, the statistical yearbooks of foreign nations, and the publications of the League of Nations on world production and trade. The Bureau of Agricultural Economics has published a rather large number of studies centering upon the uses of cotton. Demand studies were hitherto confined to the work of H. L. Moore in his *Forecasting the Yield and Price of Cotton*¹ and to the chapter on cotton published by the late Professor Henry Schultz in his *The Theory and Measurement of Demand*.² Such other phases of the subject as price factors and the foreign market have been examined in contributions to periodical literature.

Indeed, from the superficial viewpoint, the vast bibliographical material may lead the reader to assume that a rather complete coverage of the field already has been made. Upon closer examination, however, the literature reveals an inadequate treatment of new competitive forces such as the effect of synthetic fibers, the legislation affecting cotton which became law in the 1930's, staple quality competition, and the rationalization programs of certain foreign countries as they affected textile fibers.

The gravity of the situation facing cotton-growers since the first World War was an enticing invitation to search for the causes of their predicament and the prospects for the elimination of these causes. An additional attraction was the opportunity to gather further evidence in the field of commodity competition.

The methods used in this study involved:

1. A statistical study of the trend of prices, production, and consumption of cotton and its chief competitors (rayon, silk, and wool), in an effort to establish the general relationships of these commodities. These trends were analyzed with respect to each other in an effort to determine whether cotton has been adversely affected by this competition.

2. A statistical analysis of price-quantity data relating to the consumption of cotton in given uses where it must meet the competitive and complementary influences of other fibers. The discernible trends in the employment of raw material were explained in terms of the strength of competitive forces appearing in each use.

3. A study, chiefly statistical, of the trend of cotton consumption in ten leading foreign markets with a view to isolating the factors influencing the use of American cotton.

4. An analysis of the steps taken to increase the employment of American cotton in new uses or by new buyers from the viewpoint of estimating the potential demand for cotton.

This study should be useful, in the first place, to those private and public organizations which influence and determine policy with respect to the production and distribution of American cotton. The analysis clearly shows the absurdity of adopting short-run methods to achieve long-run results; the extraordinary difficulty of maintaining an artificially high domestic price for a product, a large part of which must be sold in a

¹ New York: Macmillan Co., 1917.

² Chicago: University of Chicago Press, 1938.

competitive world market; and the questionable practice of subsidizing cotton-growers at the expense of the public treasury.

In the second place, the information yielded by this study should be useful to those who manufacture and sell cotton products, for it contains an analysis of the competitive factors affecting the cotton market, both domestic and foreign; it sheds light on the deficiencies of current marketing techniques in capitalizing the advantages of cotton in a wide range of uses; it highlights the types of outlets in which cotton products encounter effective and ineffective competition from other textiles; and it emphasizes the relation between income levels and cotton-product consumption.

The chief contributions of this study are two. It synthesizes and consolidates the mass of information, in the form of statistics, books, and articles relating to the production and consumption of cotton. Analysis of the competitive forces which affect the use of cotton is the central theme. Thus the economic position of cotton, placed in its proper setting with respect to other economic factors, emerges as a complete picture. In the pursuit of this objective, a correla-

tive contribution was made in so far as further light was thrown on the stubborn problem of commodity competition.

In the assembling of material and in the writing of this thesis I have obtained invaluable aid from many institutions and persons. Many trade associations have been most co-operative in providing data. To the Cotton Textile Institute, Inc., in particular I wish to offer my special gratitude for its unfailing good will in providing source material and answering many puzzling questions. The United States Department of Agriculture, and particularly its Bureau of Agricultural Economics, has promptly given me aid at many points and has generously shared certain unpublished data of which I had need.

I am deeply indebted to Professor George H. Brown of the University of Chicago for reading and criticizing the manuscript. To Professor Edward A. Duddy of the University of Chicago, who has been unfailingly patient and gracious in his work of supervision, I am most grateful. And, finally, I acknowledge an immense debt to my wife Elizabeth, who has been patient and good humored while I have labored at this task.

CYRIL O'DONNELL

CHICAGO
June 1944

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CHAPTER I

CHANGES IN THE TOTAL DEMAND FOR AMERICAN COTTON

THE neoclassical concept of demand as finally expounded by Alfred Marshall was developed from basic utility theory. In view of the generally accepted law of diminishing utility, a negatively sloping demand curve was assumed. Other things remaining equal, the definition of demand read, the quantity of a commodity consumed varied inversely with its price. This concept may be stated in the statistical form $X_t = f(Y_t, t)$, where X_t is the quantity consumed, Y_t is its price, and t is time. This is the Cournot-Marshall demand function shifting its position through time.

The turn of the twentieth century brought forth many criticisms of this expression of demand. Most of the objections were directed at the underlying assumptions which Marshall made. It became increasingly obvious that other things did not remain the same; that the demands for various goods may be complementary and competing; and that the slope of the demand curve was not necessarily negative. These criticisms, coupled with the recording of more and more economic data, provided the incentive for the study of statistical demand curves for various commodities. Not all this work was done circumspectly, but there gradually developed a "statistical school" of economic theorists which defined its assumptions with increasing care. It is well understood today that underlying all statistical demand studies are the hypotheses that (a) in the market there is a routine of demand behavior which is reflected by statistical data and that (b) the theoretical demand curve can be ap-

proximated by a relatively simple empirical equation.

These are the assumptions made in the present chapter, wherein the statistical equation of demand for American cotton has been derived. Certain differences between the equations for the periods 1920-32 and 1920-38 emphasize the fact that radical changes have occurred in the relative importance of the factors affecting price. The succeeding chapters explain, by means of a detailed trend analysis, why the weight of the elements in the statistical equations has shifted.

The most notable studies in the statistical measurement of the demand for cotton are to be found in H. L. Moore's pioneer analysis, *Forecasting the Yield and the Price of Cotton*,¹ and in the recent work of Henry Schultz, *The Theory and Measurement of Demand*.² The late Professor Schultz's classic not only is much the more thorough in its treatment but is the only analysis of "the changes that have taken place in the shape, the elasticity, and the rate of shift of the demand curve, and of the factors which account for them."³

In his analysis of the demand for cotton, Schultz found that, *ceteris paribus*, a 1 per cent rise in the deflated price of cotton decreased the annual consumption 0.51 per cent during the period 1875-95, 0.25 per cent in the period 1896-1913, and 0.12 per cent in the period 1914-29. He found that among the

¹ New York: Macmillan Co., 1917.

² Chicago: University of Chicago Press, 1938.

³ *Ibid.*, p. 320.

more important factors to be held constant were the changes in American business conditions and shifts in the position of the demand curve. A change of 1 per cent in his index of industrial production was associated with a change of 0.57 per cent in per capita consumption in 1875-95, 0.69 per cent in 1896-1913, and 0.89 per cent in 1914-29.

Turning to an exhaustive study of the factors affecting the price of cotton, Schultz tested several hypotheses. The one found to give the best explanation was that the price of cotton depended upon the domestic supply, foreign supply, and world business conditions. The period used was 1920-32.

A test of the validity of Schultz's equation as a forecasting device during the period 1933-38, inclusive, showed that only two computed prices were within the quadratic mean error, whereas four should have been included. It is practically a certainty that new factors were at work during the 1933-38 period. In order to test this probability, a multiple correlation analysis was made for the period 1920-38 on the same assumptions that Schultz made, viz., that the domestic price of cotton depended upon the domestic supply, foreign supply, and world business conditions and that a constant elasticity function described the relationship. The results, together with those obtained by Schultz for the shorter period, are summarized in Table 1.⁴

Schultz found that an increase of 1 per cent in the domestic supply was associated with a decline of 1.39 per cent in the real (deflated) farm price. In the present study the real price was found to decrease 1.64 per cent, thus showing a significant increase in the dependence of price on domestic supply and an increase in the inelasticity of demand. The earlier

study found that an increase of 1 per cent in foreign supply was associated with a decrease of 0.7 per cent in the real price. The influence of this factor declined so greatly during the longer period, 1920-38, that changes of only 0.07 per cent in the domestic price were associated with a 1 per cent change in foreign supply. This figure is not at all trustworthy, however, because it is exceeded by its standard error. A similar trend is noted in the influence of world business conditions on the domestic price. Schultz found that a 1 per cent increase in the index of world business conditions tended to raise price by 0.95 per cent. In the present study the influence of this factor is reduced to 0.4 per cent. The coefficient of multiple correlation in Schultz's study, after being adjusted for the omission of time, which he found to be insignificant, was 0.954; in the present study the coefficient receded to 0.924.

The variance of price attributable to the domestic supply of cotton rose from 71.42 to 79.49 per cent. The variance attributable to world business conditions declined from 13 to 6.2 per cent, while the variance attributable to foreign supply declined from 8.8 per cent to zero.

Professor Schultz found that the demand curve for cotton shifted upward and to the right at the rate of 0.26 pound per capita per annum during the period 1875-95 and continued to shift at the rate of 0.35 pound per capita per annum during the years 1896-1913. However, during the last period, 1914-29, the demand curve shifted downward and to the left at the rate of 0.21 pound per capita per annum. This sharp reversal of trend was alarming. It obviously meant that, even though cotton prices and business conditions remained constant, per capita consumption of cotton would *decrease*. The trend would eventually become

⁴ Tables 1-28 appear in the Appendix.

more and more pronounced as the rate of increase in population declined.

The explanation given by Schultz for this reversal of trend was changes in styles and the increased production and importation of rayon and silk, respectively. He did not explain these factors beyond observing that the domestic production of rayon rose from 2.4 million pounds in 1914 to 36.3 million pounds in 1924 and 210.3 million pounds in 1934 (five years after the close of the period in question). His surmise was correct to a limited degree. The style factor in question involved the radical change from the voluminous costumes for women prior to the first World War to the simplified, short-skirt styles during the succeeding decade. The result was a decided decrease in the per capita consumption of woven cloth for wearing apparel and the transition from cotton to silk hosiery and from cotton to silk and rayon undergarments. In addition to these developments, rayon was being rapidly substituted for cotton⁵ in many other fields.

The growing industrialization of America, with its large demands for raw cotton, failed to offset the decline in the demand for cotton clothing products. It will be shown later⁶ that the industrial outlets for raw cotton accounted for 34-40 per cent of the total mill consumption between 1919 and 1935. In the former year the percentage stood at 38. In absolute terms, industrial consumption rose from 1,081,000,000 pounds in 1919 to 1,426,000,000 pounds in 1927 and stood at 1,280,000,000 pounds in 1939.

The rise of cotton tire fabric during this period to the position of the most important single outlet for raw cotton (from

5 to 11 per cent of the total mill consumption) certainly accounted for most of the increased industrial consumption up to 1929. Thereafter, the volume employed in these uses tended to parallel the decrease in mill takings during the depression decade of the 1930's. This is attested by the relative stability of the percentage distribution of raw cotton among household, industrial, and clothing uses.

At first glance it may be surprising that there was a considerable decline in the significance of world business conditions in view of the importance of the industrial cotton market. This change may be explained by pointing out that the domestic price structure for cotton was to a considerable degree insulated from the influence of foreign business activity during the 1930's by artificial restrictions upon the free interaction of economic forces. Should an index of American business activity be substituted, it would undoubtedly be a more significant element in the equation for the period 1920-38.

As a result of his statistical investigation, Schultz became very much disturbed about the future of the American cotton economy. He could only hope that new uses would be found for this fiber. Per capita cotton consumption in the nation began to rise in 1931 and regained nearly the entire losses recorded between 1928 and 1931. This recovery was the direct result of the gradual improvement in business activity and was indirectly aided by the efforts of the New Uses Section of the Bureau of Agricultural Economics⁷ and by a much more intelligent attitude displayed by cotton mills and their trade associations toward marketing problems.

The growing inelasticity of the demand for cotton is a matter of consider-

⁵ The direction, extent, and causes of these developments are analyzed in chap. ii.

⁶ P. 12 and Table 2.

⁷ See chap. vi.

able concern not only in the production and marketing of cotton goods but also in the field of government policy. The significance of this trend is that changes in the price of cotton tend less and less to affect the quantity consumed. As far as producers are concerned, they are in the position where total income will decline when the crop size increases. In view of the great volume of carry-over stocks which recently were more or less chronic in the United States, the chances for rising income for cotton-growers were relatively few. This was the basic consideration in the government's program to aid the cotton-producers during the 1930's; and, unless something can be done to find new foreign and domestic outlets for cotton in the future, the probability of the eventual elimination of government interference in this field is very low.

It should be observed here that the statistical data indicate a growing inelasticity of demand with respect to historical price changes. Should the price system fall to lower levels, there may be a considerable increase in elasticity. Also, should the low-income groups in our society experience an upward shift in earning power, the demand for cotton is quite likely to increase.⁸

The prospective foreign demand for American cotton does not justify a hope for domestic farm prices above ten cents per pound. The growing competition of foreign producers, their reaction to the domestic cotton price policy of the American government during the 1930's, and the historical price relationships of competitive cottons on the Liverpool market all point to this conclusion.⁹ It is not im-

plied that the foreign market is unimportant in so far as the domestic price structure is concerned. Should it be assumed that American cotton were entirely eliminated from outside markets, it is apparent that the resulting extraordinarily low prices would cause a revolutionary change in the cotton economy. The really important point is that producers should not become optimistic when considering the influence of improved foreign markets on domestic prices. The best that can be hoped for is a re-entry into foreign markets for American cotton after the current war to the extent that government production and price controls will not be required.

It is particularly significant that Schultz found the variance of the domestic price due to foreign supply to be nearly 9 per cent, while in this latter study it amounted to less than 1 per cent. Such a great change in the importance of this factor points directly to the necessity of explaining why the domestic price became relatively immune to changes in foreign production and carry-over. Quite evidently there were new forces in operation which served to insulate American prices from foreign influences.

As pointed out above, Schultz found that the demand for cotton had decreased and surmised that this was due to changing styles and to increasing competition from silk and rayon. In the two following chapters this cavalier explanation is tested inductively by means of an extended analysis of intertextile competition in the domestic market in the production of consumers' goods and industrial commodities.

⁸ *Ibid.*

⁹ See chap. v for a discussion of these factors.

CHAPTER II

TRENDS IN THE COMPETITION OF OTHER FIBERS WITH COTTON IN THE PRODUCTION OF ULTIMATE CONSUMERS' GOODS

THE employment of cotton in the production of goods for ultimate consumption depends, aside from fundamental technical requirements, upon its ability to compete with other fibers. The factors which determine its use include strength, elasticity, price, and wearing and styling qualities. In given uses several of these and other factors are usually important, although one or more may stand out prominently. An analysis of the trend in the use of cotton in the production of consumers' goods not only will bring out the chief characteristics of the products from the point of view of the consumer but will help to explain the degree to which competitive fibers have been able to invade cotton markets.

I. PRODUCTION OF COTTON GOODS

The ultimate consumption of cotton in the domestic textile industries for the period 1919-39 is summarized in Table 2. The total volume increased steadily from 2,694,000,000 pounds in 1921 to 3,737,000,000 pounds in 1927. During the succeeding four years this gain was entirely lost. Between 1931 and 1939 the consumption of this fiber recovered most of the lost ground, reaching 3,450,000,000 pounds in the latter year.

On the basis of available data, the proportion of the total volume of cotton consumption which was used in the production of clothing and industrial goods

remained quite stable from year to year.¹ The former averaged 41 per cent for the whole period, and the latter 37 per cent. The use of cotton in the production of household goods increased rather definitely in absolute terms. As reflected in Table 3, the most important form in which cotton was consumed in each of these uses was woven cloth. Second in importance was waste in industrial and household uses and knit goods for clothing purposes. The manufacture of cordage, twine, and mattress felts also required considerable quantities of cotton.

Between 1919 and 1939 the output of woven cloth (over twelve inches in width) fluctuated from a low of 1,742,000,000 pounds in 1921 to a high of 2,541,000,000 pounds in 1937. A breakdown of these figures shows that the most important types of cloth, distinguished by their weave and weight, were prints, sheetings, colored cloth, drills, tire fabric, duck, toweling, and bedspreads. In 1937 the production of these

¹ This qualification is unfortunately necessary because the estimates for the years prior to 1937 appear to be rather crude. However, the ratios appear generally to be confirmed by the data for 1937 and 1939, which are reported in the most careful study yet undertaken. The most significant differences between the two sets of ratios are the fall in the proportion of cotton going into clothing uses and the rise in industrial employments. This should not be interpreted as indicating any trend. It merely raises the question as to whether the figures of the Bureau of Agricultural Economics have overestimated clothing uses and underestimated industrial outlets.

types constituted over 75 per cent of the total cloth output. With the exception of tire fabric and about 45 per cent of the duck, these varieties may be classified as consumers' goods, since they were chiefly consumed in the production of clothing and household goods.

Since 1919 the trend in the production of table damask, drills, and gingham has been sharply downward, while print cloth, sheetings, and denims have risen markedly (Table 4). The output of bedspreads has changed but little. The manufacture of duck decreased rapidly until 1931 but has since risen quite sharply.

II. USES OF VARIOUS TYPES OF CLOTH

The outlet for bedspreads, table damask, and toweling may be readily inferred from the names of the cloth. In the case of the other types of fabric, however, the uses to which each were put were both extraordinarily varied and overlapping. Print cloth, which was manufactured in greater volume than any other in 1935, 1937, and 1939, was chiefly employed in the production of shirts, smocks, underclothing, window curtains, and draperies.² Sheetings, constituting nearly 25 per cent of the total cloth output in 1937, had outlets in both industrial and consumer uses. In the latter case, the more important were in work clothing, uniforms, linings, play suits, smocks, dress goods, bedsheets, pillow cases, draperies, and window shades. Colored cloth, third in importance by 1937, includes gingham and denim. The latter was used for overalls and other work clothing, up-

holstery, ticking, bags of all sorts, and awnings, tents, and beach shades. Gingham were used not only in the manufacture of women's and children's dresses but also in curtains, draperies, bedspreads, tablecloths, napkins, and bags of various sorts. Drills were mainly used for industrial purposes but also found outlets in the production of tents, canvas shoes, work garments, and tickings. Like most cotton cloths, duck was manufactured in a bewildering variety of weaves. In the consumer field they were chiefly employed in such goods as tents, sails, tarpaulin, awnings, hammocks, overalls, and coats for hunters, barbers, and porters.

The proportion in which raw cotton finds an outlet in specific consumer goods is clearly shown in the recent joint study of the National Cotton Council of America and the University of Mississippi.³ Those products which required over 10,000 bales of raw cotton in either 1937 or 1939 are enumerated in Table 5. During these years 58 per cent and 60 per cent, respectively, of the raw cotton utilized in apparel manufacture was devoted to the production of men's, youths', and boys' clothing. In both years the chief items consisted of shirts, trousers, underwear, and overalls. In contrast, manufactured apparel for women, misses, and juniors served as an outlet for only one-fifth of the raw cotton devoted to all clothing uses. To this, however, should be added most, if not all, of the raw cotton going into the production of retail fabrics and thread. This classification is composed of piece goods, thread, and laces—products which are used in the domestic manufacture of clothing and household appurtenances.

² H. B. Killough, "A Partial List of Uses of American Raw Cotton" (Washington: U.S. Department of Agriculture, 1927). (Mimeographed.) For a more detailed list of uses see Bureau of Foreign and Domestic Commerce, *Cotton Fabrics and Their Uses* (rev. ed.; Washington: Government Printing Office, 1930).

³ M. K. Horne and Frank A. McCord, *Cotton Counts Its Customers* (Memphis: National Cotton Council of America, 1942).

The chief household products which were manufactured from raw cotton were sheets, towels and toweling, and blankets and blanketing. In both 1937 and 1939 the manufacture of sheets required 24 per cent of the raw cotton used for household goods. The production of towels and toweling required 16 per cent, and blankets and blanketing utilized 14 per cent in 1937 and 10 per cent in 1939. The remaining half of the raw cotton used in the manufacture of household goods was distributed among twenty-three items, sixteen of which are listed in Table 5.

III. FACTORS INFLUENCING THE USE OF COTTON IN CONSUMERS' GOODS

It is possible to distinguish several factors or qualities which affect the utility of consumers' goods. Such items as design (pattern), style (that mode which by convention is regarded as most admirable at a given time), color, price, texture, durability (period of time during which the goods may be used; long life of goods), and launderability (degree to which the goods are affected by laundering processes) are quite distinct. Each is given more or less weight in any decision to purchase. For example, a buyer who approaches the problem of selecting an afternoon dress undoubtedly gives one of these factors a rather uncertain yet preponderant weight; a buyer of men's overalls is probably concerned with all the above factors except style. It is very improbable that the consumer can tell *how much* weight he assigns the various qualities, and thus their relative importance remains vague.

Changes in the relative importance of these qualities is also a factor which complicates the buying process. These variations may be due to effective advertising in which design may receive more atten-

tion than wearability, technical improvements such as those which benefited rayon by increasing its launderability, or the chemistry of dyes. Where price classes are narrow and relatively fixed, the cost element may not appreciably enter the problem of choice. Weather conditions may also affect the relative importance of the comfort factor. Buyers may insist upon cotton or wool in periods of very hot or very cold weather.

A complicated problem arises in the purchase of such an item as an adult's dress for street wear. Difficulties multiply because no quality can be assigned a given weight. A possible exception may be style, but there will inevitably be differences in utility based upon the appearance of various dresses even though all are considered "in the mode." The buyer has a choice of textile among cotton, rayon, silk, and wool. The element of price is very troublesome because it may vary from a low level, where cotton⁴ and cheap rayon compete, to a middle level, where good rayon and cheap silk are rivals (cotton, too, during a hot month), to a high level, where excellent rayon, silk, and wool are available. A given price class cannot be assumed for any but the very low-income group⁵ because the utility of

⁴ Marcia E. Turner complains of her inability to get a satisfactory cotton dress for hot-weather use in "I Want a Cotton Dress," *Textile World*, XC (March, 1940), 49.

⁵ Even here there is some question, because no one can assume that there are only cottons from which to choose among the lowest-price classes. Many items of clothing, particularly for women, are manufactured from silk, rayon, and wool and sold in the cheapest-price group.

An attempt to secure a clue to the prices of end products through a study of competitive yarn prices has been found to be futile. A bewildering variety of yarns of each fiber type are utilized by competitive producers. In addition, the problem is more complicated when combination or mixed fibers are used. An attempt to gain information on this problem from representative manufacturers yielded the additional difficulty of

many qualities in higher priced dresses, e.g., design, frequently outweighs the higher cost. Thus the high degree of inconstancy in the several qualities one looks for in the purchase of such an item makes it very probable that the ultimate decision will be determined by an extremely vague "more or less" calculus. The lack of complete satisfaction which the dress-buyer frequently exhibits in her purchase may be ascribed to this cause. Similar reasoning may explain the inability of the buyer to tell *why* she purchased the dress.

In the purchase of some types of textile products, a particular factor seems to stand out to the relative exclusion of others. These qualities seem to vary not only with the product but also with the textile from which it is made. A somewhat closer examination of this problem throws additional light upon the trend of substitution of other fibers for cotton.

A. DESIGN

The purchase of such household textiles as bedspreads, draperies, and table damask seems to be chiefly influenced by design and price. Patterns which are attractive and distinctive are eagerly sought. For these reasons manufacturers have experimented with rayon and have found that this textile retains clear, rich dyes. Furthermore, the viscose and acetate rayons take different dyes. When rayon is mixed with cotton, silk, or wool, additional color patterns become available. These circumstances made possible a large variety of color combinations and contrasts and greatly enhance the eye appeal of clothing and household products.

In 1935, rayon bedspreads accounted for 9 per cent of the total production,

while rayon- and cotton- yarn mixtures accounted for slightly more.⁶ In the same year draperies manufactured from rayon yarn amounted to 10 per cent of the total production, and rayon- and cotton- yarn mixtures were used to produce 24 per cent of the output of this item. Although the census fails to indicate the proportion of table damask which is manufactured from rayon yarn, the 67 per cent decrease in the production of cotton cloth for this purpose (Table 4) would indicate that the competition from other fibers encountered by cotton is very serious. The tendency to substitute rayon for cotton in these uses is probably due to the very attractive color patterns which can be attained by treating rayons with various dyes.⁷

B. WEARING AND LAUNDERING QUALITIES

There are many products which consumers buy on the basis of their wearing and laundering qualities. Typical of these are sheets, shirts, overalls, awnings, and tents. The competitive position of cotton in the manufacture of these goods is unassailable. Cotton bedsheets are cool and comfortable. They have long life and launder exceedingly well. Work shirts manufactured from sheeting have similar advantages. Although denim has other uses, its wide employment in the manufacture of overalls is due to the demand for a cloth which can withstand hard wear and frequent laundering. Similar

⁶ U.S. Bureau of the Census, *Biennial Census of Manufactures: 1935* (Washington: Government Printing Office, 1938), p. 330.

⁷ Rayon manufacturers grant promotional allowances to mills using their yarn. These firms, in turn, pass at least part of the grant on to retailers for the purpose of special displays and other means of advertising rayons. Since cottons are not pushed in this way, it is possible that the inroads of rayon materials are partly due to manufacturers' promotional allowances (personal interview, November 17, 1938).

properly identifying the product in question (letter from F. A. Hartmann, chief statistician, National Association of Hosiery Manufacturers, July 9, 1940).

reasons assure a large market for cotton duck.

C. PRICE

The production of men's hosiery offers a striking case of price competition between cotton and rayon. During the period 1927-39 the average production of this product, as indicated in Table 6, was 40,700,000 dozen pairs. The apparent tendency for total output to decline in 1937-39 is due to the consumption of anklets and slack and crew socks. In the latter year the production of these types amounted to 14,219,000 dozen pair, of which 5,286,000 dozen pair were cotton and 7,736,000 dozen pair were rayon.

The percentage of hosiery production manufactured from silk and from such mixtures as cotton and rayon, cotton and wool, and rayon and silk remained very steady throughout the period. Marked changes are noted in the relative proportions in which cotton and rayon were used. In 1927 nearly half the output of men's hosiery was made of cotton and only 13 per cent was produced from rayon. Between 1931 and 1937 the proportions were nearly equal, with rayon and cotton being the more important on alternate years. Rayon took a sharp drop in volume by 1939, since the 49 per cent attributed to this fiber apparently includes all the mixtures. Comparable ratios for anklets and slack and crew socks were 54 per cent for rayon and 37 per cent for cotton.

Comparative mill prices of men's cotton and rayon hose are available for the period 1919-27 and are shown in Table 7. In the former year the price of cotton hose was 27.6 per cent of the price of rayon hose. This ratio decreased to 25.4 per cent in 1921 and thereafter rose at a steady pace to 37.5 per cent in 1927. The price of cotton hose dropped from

\$1.592 per dozen pair in 1927 to \$.765 in 1933. In 1939 the price stood at \$.810. The rayon price series was discontinued in 1927. However, a continuation of the above trend in the prices of rayon and cotton hose may be inferred from the indices of the prices of several cotton and rayon yarns.⁸ Between 1919 and 1938 the average decline in the index of the prices of five selected cotton yarns amounted to 116 points, while the average decline in the index of the prices of four selected rayon yarns was 243 points. In absolute terms, rayon-yarn prices declined from \$4.40 per pound (150 second quality) in 1919 to \$.502 per pound in 1938, while the price of southern single-warp cotton yarn (40/1) decreased from \$.91 per pound in 1919 to \$.317 per pound in 1938. During the period 1931-37, when the volume of rayon hose and of cotton and rayon hose production was apparently stabilized, the average price of the above qualities of rayon and cotton yarns was \$.617 and \$.3858 per pound, respectively. With this price relationship the volume of cotton hose approximately equaled the output of rayon hose.

In this use cotton has fared rather badly in the competitive struggle with rayon. This has been primarily due to the relative decline in the price and the rise in the quality of rayon. The style factor can be catered to as the prices of cotton and rayon fibers approach equality. The element seems to be important among those men engaged in clerical, professional, and executive employments.

⁸ The selected cotton yarns were: northern, cones, 10/1 and 22/1; southern, single warp, 40's; and twisted, weaving, 20/2 and 40/2. The rayon yarns included 150 first quality, 150 second quality, 300 first quality, and 300 second quality. For the price series see U.S. Bureau of Labor Statistics, *Wholesale Prices* (Washington: Government Printing Office).

On the other hand, there will be a continuing need for cotton hosiery among those men whose occupations require much standing or walking, where appearance is unimportant, and for those in low-income classes where even small price differentials are important.

The influence of price in the choice of style goods is further illustrated in the field of women's hosiery. As shown in Table 8, the total output of women's hosiery increased from 51,400,000 dozen pair in 1919 to 59,600,000 dozen pair in 1923 and 1925. From this peak, output declined to a low of 42,600,000 dozen in 1931 and thereafter increased to a new high of 63,600,000 dozen pair in 1939. Thus, during the twenty-year period, the total output increased 12,200,000 dozen pair. When classified by fibers, the manufacture of women's hosiery showed three clear-cut trends. The output of cotton hose decreased from 72 per cent of the total production in 1919 to 9 per cent of the total in 1939; the production of silk hosiery increased from 4 per cent of the total in 1919 to 84 per cent of the total in 1939; and the output of rayon hose increased from 1.4 per cent of the total in 1919 to 16.7 per cent in 1931 and thereafter declined to 6 per cent in 1939. The manufacture of women's hosiery from wool and from mixtures of the various fibers has been unimportant as a competitive factor since 1923.

The trend in the production of rayon hose is the record of an unsuccessful attempt to utilize a synthetic fiber in this field. Buyers found certain important drawbacks to rayon, particularly its clamminess and lack of resistance to water. Even though the latter difficulty was eliminated during the early 1930's, the prejudices which were built up as a result of promoting an inferior product in the decade previous have not been eradicated. Consequently, the use of rayon re-

mained in 1939 of little relative importance in the field of women's hosiery.

The drastic decline in the consumption⁹ of women's cotton hosiery was attributable, for the most part, to the relative decline in the price of silk hose as compared with the price of cotton hose, to the change in the per capita (for women over fifteen years) national income, and to the consumption of other than cotton and silk hosiery.¹⁰ Choosing a con-

⁹ Data covering the size of manufacturers' stocks and age-of-hosiery inventory of department stores indicate that no serious error is entailed in using production figures to indicate the volume of consumption. The average end-of-the-month stocks held by manufacturers slowly rose from 17,766,000 dozen pair in 1934 to 21,785,000 dozen pair in 1937 according to *Survey of Current Business*. In 1937 department and specialty stores reported that from 2 to 4 per cent of their hosiery inventory was over twelve months in age (see H. I. Kleinhaus, 1937 *Departmental Merchandising and Operating Results of Department Stores and Specialty Stores* [New York: Controllers Congress, National Retail Dry Goods Association, 1938]).

¹⁰ In the equation $X_1 = f(x_2, x_3, x_4, x_1, x_1)$ represents the production of cotton hosiery divided by the number of women in the United States fifteen years and over in age (for the noncensus years these data were interpolated from the straight-line trend of the percentage of female population fifteen years of age and over for the Census of Population, 1920, 1930, and 1940); x_2 represents the percentage which the price of cotton hosiery was of the price of silk hose; x_3 represents the index (1919 = 100) of the national income divided by the number of women fifteen years and over in the population; and x_4 represents the production of hosiery other than cotton and silk divided by the number of women fifteen years of age and older. These were the factors which affected the consumption of cotton hosiery on the assumption that

$$\log x_1 = (.384235) (10^7) \log x_2^{-2.0192} \log x_3^{-4.66626} \log x_4^{1.1007}$$

A time factor indicating change in taste was omitted in the equation for several reasons. The largest increase in the production of silk hosiery took place between 1923 and 1925, when short skirts (for day wear) became fashionable. For the remainder of the period under discussion there was no return to long skirts, although there were variations in the length of skirts. Consequently, silk hosiery was a style product throughout the period, and consumption depended on population, price, and income. There is no evidence to show that

stant elasticity function to describe the relationship between these variables, the corrected coefficient of multiple correlation was found to be 0.81.

The net effect of an increase of 1 per cent in the ratio of the price of cotton hosiery to the price of silk hosiery was to decrease the consumption of cotton hose by 2 per cent (± 0.89). Thus, as the price of silk hosiery declined relative to the price of cotton hosiery, the consumption of the latter tended to decrease twice as fast. A similar relationship was discovered in the influence of national income on cotton hosiery consumption. The net effect of an increase of 1 per cent in the index of per capita income (for women) was to decrease the consumption of cotton hosiery by 4.7 per cent (± 1.4). This is very significant. It indicated that, when the income of women increases, there is a marked shift from the purchase of cotton hosiery to the purchase of silk hose. Finally, the consumption of hosiery manufactured from rayon and mixed yarns tended to vary directly and in the same ratio with the consumption of cotton hosiery. An examination of Table 8 provides the explanation. The output of all types of women's hosiery, with the exception of silk, declined precipitately and in nearly the same ratio. There is no evidence that rayon displaced cotton in any important degree.

This analysis leads to the conclusion that the bulk of the women's hosiery market is definitely lost to cotton so long as the purchasing power of women rises, or is maintained at the level of the 1930's, and as long as the relative price of silk hosiery declines. Price was unquestionably of secondary importance. Between 1919 and 1923, when cotton hose still

dominated the market, the price of silk hosiery averaged 444 per cent of the price of the cotton product. Between 1923 and 1929 the production of cotton hose declined 79 per cent, and the output of silk hosiery increased 813 per cent. The price of silk hose averaged 475 per cent of the price of cotton hose. Despite the favorable price movement with respect to cotton, that fiber rapidly lost ground. This was the period when women's clothing styles featured short skirts. The rise in the national income during these years enabled women to satisfy their desire for a hose of much greater appeal than cotton possessed. Between 1931 and 1939 the price of cotton hose was fairly stable around \$1.50 per dozen pair while the price of silk hosiery fluctuated rather closely about \$5.70 per dozen pair. Thus, despite the fact that the price of silk hose was 380 per cent greater than the price of the cotton product, the consumption of the former rose during this period from 27,800,000 dozen pair to 53,400,000 dozen pair.

This evidence emphasizes the part played by per capita income in the consumption of a style product in the luxury class. It is of primary importance. When competitive price movements, at the same time, favors the styled goods, consumption expands still further.

The consumption of cotton hosiery during the 1930's remained stable around 4,600,000 dozen pair. This steady volume was maintained by people who used this product despite the factors which favored silk hosiery. Relative prices were unimportant to these individuals who are to be found among nurses, members of religious organizations, and very low-income groups—buyers whose indulgence in a style product is either forbidden by institutional rules or made impossible by the lack of purchasing power.

tastes changed from 1925 to 1939. Had this period been used, the coefficient of correlation would undoubtedly have considerably exceeded 0.81.

CHAPTER III

INDUSTRIAL USES OF COTTON

A SUBSTANTIAL proportion of the domestic consumption of cotton is utilized by a wide variety of industrial establishments. For the year 1936-37 it was estimated that industrial outlets were found for 40 per cent of the total consumption.¹ Reference to Table 3 recalls to mind that the chief types of cotton products finding their way into industrial uses are woven goods, waste, cordage and twine, and thread and yarn. Of these, the first mentioned constituted about 70 per cent for the selected years. Averaging 12 per cent, waste was second in importance. Prior to 1942 the principal industrial outlets for cotton products were usually listed as automobile tires, bagging, pyroxylin-coated fabrics, belts and belting, and filter cloth. As a result of the co-operative efforts of the National Cotton Council of America and the University of Mississippi to determine the specific uses of cotton, a much clearer picture can now be drawn.² Fifty-six distinct industrial uses were enumerated, and an estimate of the volume of consumption in each one was made for 1937 and 1939. In twenty-five of these the volume was less than 10,000 bales. The remaining uses which were identified are listed in Table 9.

The obvious feature of the foregoing data is the distribution of the total volume of cotton among the various indus-

trial outlets. In view of the widespread use of the automobile, it is not surprising that 30 per cent of the total industrial consumption of raw cotton is devoted to the production of tire cord and upholstery, linings, and slip covers. The use of cotton bagging is of outstanding importance despite the inroads of paper in recent years. The cotton bale covering, properly a form of bagging, experienced a rapid growth during the two years in question. This was primarily due to the untiring efforts of the New Uses Section of the Bureau of Agricultural Economics.^{2a} It was pointed out in the previous chapter that the cordage and twine industry has been a consistently large consumer of raw cotton. Its chief products are cordage (rope), industrial thread, twine, and fish nets, netting, and seines. The remaining classifications which annually consume about half the industrial cotton are significant in so far as they depict the wide variety of uses to which producers put this natural fiber.

The data in Table 9 cover far too short a period to indicate trends in this type of consumption. In general, it may be said that there are three fundamental factors which are primarily responsible for variations in the annual volume utilized by industry. The most important is undoubtedly the business cycle. This accounts for the wide and rapid changes in the total quantity of cotton destined for industrial users, a fact which is so apparent in Table 2.

¹ R. J. Cheatham, "Cotton Utilization and New Industrial Uses" (Washington: U.S. Department of Agriculture, 1937), p. 6. (Mimeographed.)

² M. K. Horne and Frank A. McCord, *Cotton Counts Its Customers* (Memphis: National Cotton Council of America, 1942).

^{2a} For details of this activity see chap. vi.

A second factor is the natural growth in total population. Its influence is reflected in the industrial demand for cotton manufactures in such outlets as shoes, medical supplies, laundry equipment, mattress stuffing, luggage, and caskets. Of course, population growth should be qualified, for quite clearly national income, mechanization, and education are also important elements which determine the volume of consumption of such products. Finally, military requirements are of tremendous importance in time of war. On such occasions the demands for tents, duck, and other cotton products are enormous.

A minor criticism of Table 9 involves the classification of awnings, medical supplies, tents, and mattress stuffing among industrial outlets for raw cotton. It is suggested that these properly belong among household consumers' goods. Furthermore, this table omits the production of waste. It may be remembered that in 1935 the output of this item amounted to 364,000,000 pounds.

In such employments as tire cord and bagging an analysis of the competitive conditions facing cotton can be made. A few excellent studies contributed by the Bureau of Agricultural Economics furnish the basic data. These have been supplemented by the writer, as will be shown below. In these fields the chief competition encountered by cotton products comes from jute, paper, and rayon. Until the last few years, cotton was exclusively employed in tire-cord production, but the manufacturers are now experimenting with rayon. In the bagging field, jute held undisputed sway until paper was introduced in 1925. Cotton had been used in limited quantities, but its employment was largely experimental prior to 1927. For instance, an excellent weave for cotton bales was

manufactured by a few mills in 1888, 1889, and 1909.³ During the years of large cotton crops, such as were harvested in 1908, 1914, 1920, and 1926, there was considerable interest in proposals for cotton bagging because cotton prices were low and jute prices high. In 1927 the Division of Cotton Marketing in the United States Department of Agriculture set out in earnest to experiment with various weaves of cotton for use in bagging a variety of products.

Osnaburg, one of the weaves in question, is woven from cotton yarns spun from low-grade raw cotton and from cotton waste. A considerable variety of osnaburg is produced. The quality depends upon the staple and class of cotton and the amount of waste employed. The yarn counts vary from 6's to 10's, the figures referring to the number of hanks of 840 yards each in one pound of yarn. The volume of osnaburg manufactured in 1927 was 72,248,000 pounds. The output declined severely during the succeeding years, but in 1937 it recovered to 68,477,000 pounds. It was estimated that the volume of raw cotton and cotton waste required to manufacture the output for 1927 was 167,700 bales of 478 pounds net.⁴

Sheeting is used for bagging those products such as fertilizer which may sift through loose weaves. The type of sheeting used is woven from yarns ranging in count from 12's to 18's (coarse), 18's to 22's (medium), and 22's to 26's (fine).

³ B. Youngblood, R. J. Cheatham, and R. L. Nixon, "Cotton Bagging for Cotton" (Washington: U.S. Bureau of Agricultural Economics, 1928). (Mimeographed.)

⁴ R. J. Cheatham and Rodney Whitaker, "Cotton and Other Materials Utilized in Bags for Cement" (Washington: U.S. Bureau of Agricultural Economics, 1937), p. 7. (Mimeographed.)

I. AUTOMOBILE TIRES

A. VOLUME OF COTTON REQUIRED
FOR TIRE PRODUCTION

The most important single use of raw cotton is to be found in the manufacture of tire fabrics. Between 1921 and 1936, inclusive, the percentage of raw-cotton consumption which went into this product varied between 4.8 and 10.8.⁵ The average approximated 8 per cent.

Variation in the volume of cotton required for the production of tire fabric depends upon both the output of tires and the technological changes in tire construction. The volume of tire production depends upon the number of tires required for the original equipment of new cars and trucks and upon the quantity destined for renewals. Between 1921 and 1936 the estimated number of renewal tires per automobile in use decreased from 3.3 in 1929 to 1.6 in 1932 and 1935.⁶ The principal reasons for this development were the increased mileage obtainable from a tire and better roads, but these advantages were partially offset by the increase in the number of miles per year and increased speed at which automobiles have been driven.

As a result of improvements made in the manufacture of tires, such as the change from the old high-pressure fabric tire to the balloon tire, the use of cotton fabric per passenger-car tire has increased from approximately 2.5 pounds to 3.25 pounds. For all types of tires the quantity of fabric per casing increased from 3.5 pounds in 1923 to 4.2 pounds in 1936. This trend has been induced chiefly by the growing practice of equip-

ping trucks, busses, and farm vehicles with pneumatic tires. By 1937 the typical 6.00×16 passenger-car tire required about 3.25 pounds of fabric, the 6.00×20 light truck tire used 7 pounds, and the heavy-duty truck tire about 27 pounds.

B. COST OF TIRE FABRIC

The percentage of sales value of a tire represented by the cost of the fabric from which it is constructed varies considerably from year to year. For the years 1935, 1936, and 1937 the writer has estimated this percentage to be 16.2, 15.2, and 13.4, respectively.⁷ These figures correspond well with the data calculated by E. G. Holt.⁸ For the years 1927, 1929, and 1931 Holt estimated that the percentage was 12.16, 18.63, and 15.40, respectively. If one assumes that the percentage of fabric cost to tire price is 20 per cent, a change of 50 per cent in fabric cost would affect the tire price by only 10 per cent. To purchasers of tires a price change of this much probably would have little effect, since it is a well-known fact that tire cost is relative-

⁷ Calculated in the following manner:

RELATION BETWEEN THE COST OF COTTON
TIRE FABRIC AND THE PRICE
OF TIRES

Year	Tire Prices (Wholesale)*	Cotton Tire Fabric (Per Pound)†	Fabric per Tire (Pounds)‡	Per Cent Tire Fabric to Tire Price
1935.....	\$ 9.316	\$0.36	4.2	16.2
1936.....	9.683	.35	4.2	15.2
1937.....	11.575	0.47	4.2	13.5

* U.S. Bureau of the Census, *Statistical Abstract of the United States: 1939* (Washington: Government Printing Office, 1939), p. 320.

† Prices as of January 1, each year, quoted in a letter to the writer from the Goodyear Tire and Rubber Company, August 30, 1940.

‡ See text above, p. 14.

⁵ R. J. Cheatham and A. Mason Dupre, Jr., "Cotton Used in Tire Fabrics" (Washington: U.S. Department of Agriculture, 1937), p. 9. (Mimeographed.)

⁶ *Ibid.*, p. 13.

⁸ "Costs of Rubber Industry Materials and Operations Indicated by Official Data for 1927, 1929 and 1931" (U.S. Bureau of Foreign and Domestic Commerce, Special Circular No. 3502 [Washington, 1933]). (Mimeographed.)

ly small as compared with the total cost of car operation. Consideration, however, should be given to such variables as the postponability of purchase and its counterpart, the possibility of losses from blowouts. Small increases in tire prices would result in a tendency for many buyers to delay replacements. Unless accompanied by a definite decrease in the average speed with which such buyers habitually drive, the increased danger of costly accidents resulting from defective tires would be an important factor in any decision affecting replacement demand.

C. RAYON COMPETITION

In the early years of tire manufacturing, experiments were made with fabric produced from silk, flax, wool, and ramie. These proved unsatisfactory for many reasons, and cotton was adopted as the most desirable textile for tire casings. This textile received no competition until about 1936, when tests were made with rayon fabric. A survey of six leading tire manufacturers in 1939 revealed that four companies were making rayon-fabric tires, one had decided not to experiment, and one refused commitment on the questionnaire.⁹ Three firms were convinced of the technical superiority of rayon as compared with cotton fabric, but these same firms claimed that the chief drawback to the general use of rayon was its price disadvantage. The consensus of those firms which favored rayon over cotton was that the price of the former fabric must come within 25 per cent of the price of cotton before there could be a pronounced trend toward the use of rayon. These firms

believed that rayon-fabric tires could be sold in volume at a price differential against them of not over 10 per cent.

Up to the present time rayon fabric has been used in the manufacture of heavy-duty tires and in a de luxe line for passenger cars. The chief advantage of these tires lies in their long life, a characteristic induced by the high tensile strength of rayon and its ability to withstand high temperatures. For firms operating a fleet of trucks—firms which can watch their operating costs—the longer life of rayon-fabric tires will tend to compensate for their higher costs. Tentative experiments which have been made along these lines appear to bear out this conclusion.

The disadvantages which rayon suffers in competition with cotton fabric have to do with the elasticity of the cords, price, and the possibility of developing a new cotton weave. The firm in the above survey which objected to the use of rayon emphasized the fact that rayon fabric notably lacks the elasticity of cotton. This concern was experimenting with a new cotton weave which would retain the typical elasticity of this textile and yet approximate the desirable characteristics of rayon fabric.

Until satisfactory progress is made in this field, cotton must rely upon the price differential for protection against the competition of rayon in the tire field. On January 1 of each year from 1935 to 1940, inclusive, the price of cotton tire fabric manufactured from 1 $\frac{1}{8}$ -inch American raw cotton varied between a high of 37 cents per pound and a low of 27 $\frac{1}{2}$ cents per pound.¹⁰ During this period there was no open market for rayon-cord tire fabric, since nearly all of it was manufactured in "captive"

⁹ Conducted by the writer. One should bear in mind that the reporting companies may be biased in favor of the type of experimental work which each was carrying on.

¹⁰ Personal letter from the Goodyear Tire and Rubber Company, August 30, 1940.

mills which are subsidiaries of rubber companies. During this time the estimated open market price would run between 65 and 70 cents per pound. On the assumption that the same amount of rayon fabric would be required in the production of a tire as cotton fabric, such a price differential between the two fabrics would cause rayon-cord tires to sell at a figure between 16 and 27 per cent more than comparable cotton-cord tires.¹¹ Even if there were no additional costs in using rayon fabric instead of cotton, a price differential this great is considerably above the estimated difference in cost which the manufacturers stated as the maximum premium at which the new-type tires could be sold in volume.

For the first time in many years we find cotton facing the possibility of severe competition in the tire-fabric field. It is still well protected in this use by the relatively high price of rayon fabric, but there is no way to determine when technological improvements in the manu-

¹¹ These figures are based upon the following calculation. Assume that cotton-cord tires sell for \$15.00 and that the cost of the fabric in them is 20 per cent of the total (see p. 14 for the basis of this ratio). On January 1, 1937, cotton fabric cost \$0.37 per pound, while two years later it cost \$0.27½ per pound. On the same dates rayon fabric cost (probably) \$0.70 and \$0.65 per pound, respectively. Thus if rayon were employed instead of cotton, the fabric cost would be 189 per cent greater in 1937 and 236 per cent in 1939. This would increase the fabric cost in the \$15.00 tire from \$3.00 to \$5.67 in 1937 and to \$7.08 in 1939. Hence the \$15.00 tire would cost \$17.67 in 1937 and \$19.08 in 1939 if made of rayon fabric. This represents an increase of 16 per cent and 27 per cent in the respective years.

Some manufacturers have apparently claimed a mile-life for rayon-cord tires greater by two to four times than the mile-life of cotton cords in experiments with heavy-duty tires carrying an overload in a hot climate (see Cheatham and Dupre, *op. cit.*, p. 21). If such claims as these are eventually proved, there can be no question that rayon cords will displace cotton cords in heavy-duty service.

facture of the latter fabric may result in a large decrease in its price as compared with the price of cotton. Greater reliance must be placed on the possibility of improving the weave of cotton fabric in such a way as to reduce the relative advantages of rayon. Otherwise, cotton mills face the loss of their most important single domestic market.

II. FERTILIZER BAGS

During the ten-year period 1927-37 the practice of bagging fertilizer in cotton has grown substantially. A report issued by the Bureau of Agricultural Economics indicates that the proportion of fertilizer tonnage packed in this type of container increased during this period from about 2.5 per cent to nearly 12 per cent.¹² Apparently no paper bags were utilized in 1927, but ten years later somewhat less than 6 per cent of the tonnage was bagged in this way. These gains for cotton and paper were made at the expense of burlap bags. As an outlet for raw cotton, this field may be considered relatively unimportant, since slightly less than 20,000 bales were used in the manufacture of cotton fertilizer bags in 1937. But, in absolute terms, this is an important volume. Indeed, should cotton replace burlap entirely, the potential consumption would amount to approximately 148,000 bales. On the other hand, the loss of one or two markets of this size would be definitely harmful to the growers, middlemen, and manufacturers.

¹² R. J. Cheatham and R. B. Evans, "Utilization of Cotton and Other Materials in Fertilizer Bags" (Washington: U.S. Department of Agriculture, 1939). (Mimeographed.) Unless otherwise specified, the statistical data used in the textual discussion of fertilizer bagging were taken from this source.

A. REGIONAL PREFERENCES IN BAGGING MATERIALS

Interesting variations may be noted in the geographical distribution of fertilizer classified by types of bagging materials. The South Central states were the only ones which purchased fertilizer sacked in cotton during the year 1927-28. At that time nearly 13 per cent of the tonnage used in the region was shipped in bags made of this textile. A decade later over 55 per cent of the fertilizer sold in that section was cotton-bagged. During the same period the proportion of fertilizer shipped in cotton containers to the South Atlantic region rose from 1.1 to nearly 7 per cent. Although cotton bagging is little used in the remaining regions of the United States, slight increases were indicated during this decade.¹³ In every instance the improvement in the position of cotton was made at the expense of burlap bagging.

The areas in which paper-bagged fertilizer made the greatest inroads were the Western and North Atlantic. The proportion of the product packed in this material in 1937 was over 36 per cent in the former area and 15 per cent in the latter. The remaining regions purchased from 2 to 5 per cent of their tonnage in paper bags during the same year. With the single exception of the North Atlantic states, all sections of the country reported that the inroads of paper bagging have been made at the expense of burlap and not cotton.

B. TREND IN BAG SIZES

From the point of view of the competitive position of burlap, cotton, and

paper bagging, the trend toward smaller bags is important. The chief sizes of bags, as measured by the weight of their net contents of fertilizer, are 200, 167, 125, and 100 pounds. Between 1927 and 1937 the percentage of fertilizer packed in 200-pound bags decreased from 70 to 48. Employment of the 167-pound size also decreased, since 10 per cent of the tonnage was sold in this type of bag in 1927 and only 7 per cent ten years later. Use of the remaining two sizes showed marked increases. The proportion of total tonnage shipped in 100-pound bags increased during the decade from 13 to 26 per cent and that contained in the 125-pound size rose from 8 to 18 per cent.

Cotton bags were important only in the 100- and 200-pound sizes. In 1937, 6.6 per cent of the total fertilizer output was shipped in cotton bags of the former size and 4.4 per cent in the latter. In the same year approximately one-half of the product packed in burlap bags was shipped in the 200-pound size. The 125-pound bag was second in importance with 17.4 per cent, and the 100-pound bag third with 13.5 per cent. Practically all of the remainder was shipped in the 167-pound bag. Paper bagging is almost exclusively confined to the 100-pound size.

The South Atlantic and South Central states consumed nearly all the fertilizer shipped in 200-pound bags during 1937. In the former area 80 per cent of all tonnage consumed was contained in bags of this size, whereas in the latter region 24 per cent of all tonnage was purchased in the 200-pound container. The North Atlantic and the South Atlantic areas used all the fertilizer packed in 167-pound containers, all of which were made of burlap. The East North Central sec-

¹³ The North Atlantic states were an exception where the percentage of fertilizer bagged in cotton decreased from 1.1 in 1927-28 to 0.2 per cent in 1937.

tion packaged 85 per cent of its output in 125-pound bags, while the West North Central, North Atlantic, and South Central regions, respectively, used this bag size for 33, 20, and 15 per cent of their output. The 100-pound bag was the most popular in the Western, West North Central, South Central, and North Atlantic areas, where the percentage of fertilizer in this size was 99, 62, 61, and 52, respectively.

C. SECONDHAND BAGS

The employment of secondhand bags in this industry was of little importance. Only 7 per cent of the total tonnage was shipped in used containers, although in the Western region 45 per cent of the tonnage found its way to consumers in bags of this type. The chief advantage in the employment of used bags lies in the fact that they cost the mill from 25 to 50 per cent less than new containers. This, however, is a mill advantage and not one which is passed on to the ultimate consumer. Burlap bags which may have been used to package raw sugar, coffee, flour, etc., are sold to independent dealers who clean, mend, and bale them for resale. Used cotton bags are not employed in the fertilizer industry.

D. FACTORS DETERMINING THE VOLUME OF COTTON BAGGING

1. *Volume of fertilizer consumption.*—The most important elements which determine the amount of cotton bagging used in the fertilizer industry are the demand for fertilizer, relative costs of various types of bagging, and manufacturers' and consumers' preferences. It is, of course, obvious that the volume of all types of bagging used by this industry depends upon the consumption of its product. This factor is in turn influenced by deficiencies in soil nutrition as evi-

denced by the sale of 65 per cent of fertilizer tonnage in Atlantic seaboard states, where soil fertility has been largely depleted. Progressive deterioration of agricultural soils in other parts of the United States is a real long-run possibility. However, the consumption of fertilizer in any one year is much more closely related to prevailing and prospective economic conditions. At least an equally important factor in bag consumption is the tendency of fertilizer manufacturers to increase the degree of concentration of food elements in a given volume of output. In 1936 the degree of concentration was 24 per cent greater than in 1920. Thus bag requirements for the same volume of soil food decreased 24 per cent in sixteen years.

2. *Manufacturers' preferences.*—A survey of manufacturers' preferences for bags of particular types indicated that for physical ease in handling their product the burlap bag in 100- and 200-pound sizes was best.¹⁴ In the 25-pound size they preferred cotton. They also favored burlap from the point of view of closing ease, resistance to handling wear, resistance to chemical deterioration, and protection to contents, although in the latter instance they chose paper bags in the 25-pound size. The producers indicated their preference for cotton from the point of view of appearance and salvage value in much greater numbers than were actually using cotton bags.¹⁵ The survey showed, however, that in every instance there was a considerable difference of opinion. In the 200-pound size, the preferences expressed in favor of burlap ranged from three to

¹⁴ *Ibid.*, p. 24.

¹⁵ The value of salvaged cotton bags is to be found, not in their re-use for packaging purposes, but in the great variety of uses on the farm and in the household.

one to four to one. In the 100-pound size, burlap was preferred by a majority of between two and three to one.

3. *Consumers' preferences.*—Reliable information on consumer preferences is unfortunately unavailable. From the fact that cotton-bagged fertilizer has its greatest outlet in the cotton-growing South it may be inferred that product "patriotism" is of considerable importance. There does not seem to be any reason to doubt that producers of raw cotton would desire to use their product in the manufactured state. But, in doing so, they are sometimes penalized. During the early part of 1938 an extra charge of 50 cents per ton was made for fertilizer packaged in cotton and sold along the South Atlantic seaboard. In the South Central region no extra charge was made at that time.

A second reason which may influence consumers lies in the salvage value of cotton sacks. In low-income areas this factor could be of considerable importance, especially in household and clothing uses. In the absence of consumer specification of cotton, manufacturers would probably be chiefly influenced by the relative costs of the types of bagging fiber.

4. *Cost of bagging in various fibers.*—Since approximately 85 per cent of the cost of bags represents the outlay for fabric, the relation between the price of burlap and the price of osnaburg, from which cotton bags are manufactured, is of considerable importance in determining their competitive strength. An examination of the statistical information in Table 10 shows that the average price of burlap between 1932 and 1939, inclusive, was 5.59 cents per linear yard, while the average price of osnaburg for the same period was 8.55 cents per linear yard. The index of burlap, osnaburg,

and cotton-yarn prices shows that cotton prices varied much more widely from year to year than burlap prices.¹⁶ When cotton bagging was introduced in 1927, and later in 1932, the cost of bags made of this material bore a favorable relationship to the cost of burlap bags, but in subsequent years their respective prices moved disadvantageously with respect to cotton.

This disparity in the cost of the two fabrics was somewhat modified by several factors. First, the burlap employed in the manufacture of 100-pound bags was as heavy per yard as for the 200-pound size. In terms of a linear yard of 40 inches in width, the burlap used for bagging weighed 10 ounces. In the case of osnaburg bags, the weight of the material in the 200-pound bag was 7.8 ounces per linear yard of 40 inches in width, while the comparable figure for the 100-pound bag was 6.2 ounces.

Second, cotton has an advantage owing to its weave and texture. Material for the 200-pound bags can be cut 2 inches shorter than the fabric for burlap bags of the same size and an inch shorter than burlap for the 100-pound bag. The seams for the cotton bag are narrower, and the tendency of cotton to stretch makes it possible for a smaller bag than burlap to contain the same volume of fertilizer.

Third, the 200-pound cotton bag weighs 718 pounds per thousand, while burlap bags of the same size weigh 945 pounds per thousand. In the 100-pound class, cotton bags weigh 380 pounds per

¹⁶ Osnaburg prices for all the years in the 1927-37 period were unavailable. Since this type of cotton cloth is manufactured from low-grade cotton and cotton waste, and since the index numbers for osnaburg moved reasonably close to the index number for a typical cotton yarn from which osnaburg is made, comparison of the index of burlap prices was made with the index of prices for this particular yarn.

thousand and burlap bags 630 pounds per thousand. Since shipping costs are based upon bag weight, a considerable advantage rests with cotton containers. In March, 1938, the 100-pound-bag size in paper cost \$0.90; in burlap, \$1.20; and in cotton, \$1.40.¹⁷ In the 200-pound class the burlap bag cost \$0.88 and the cotton one \$1.22. Hence at that time the manufacturer paid 16.7 per cent more for the 100-pound cotton container than for burlap, and in the 200-pound size the cotton bag cost 38.6 per cent more than burlap. In 1937, when the bags were probably manufactured, the average price of 7-ounce, 30-inch osnaburg was 74 per cent more per linear yard than the average price of 10½-ounce, 40-inch burlap per linear yard.¹⁸ Thus the sizing and weight advantage of cotton fabric helps to reduce the cost advantage of burlap fabric.

The percentage of bag cost to fertilizer price was, in 1938, relatively small. In the 100-pound container cotton bags cost 5.2 per cent of their contents in fertilizer as compared with 4.5 per cent for burlap bags and 3.2 per cent for paper containers. In the 200-pound size, cotton bags cost 4.5 per cent of their contents in fertilizer, while burlap bags cost 3.2 per cent. It is in the former size that cotton bagging competes more closely with burlap, and this partially explains why more fertilizer was packaged in cotton bags of this size than in the larger

size. The customary bag-size purchased in the various regions probably accounts for the continued use of the higher-cost, large-size cotton container.

The evidence of the competitive struggle between cotton, paper, and burlap would appear to warrant the conclusion that the physical and cost advantages of burlap weigh heavily with fertilizer manufacturers. Unless consumers are activated to the point where they specify cotton bagging, and unless the competition between fertilizer producers in particular areas is keen, it seems clear that burlap will continue to be used for packaging the great bulk of the nation's fertilizer. From the competitive angle, cotton-growers and osnaburg manufacturers should cultivate this field as an outlet for their product. If any degree of success is attained, fertilizer manufacturers, unless tightly organized, would absorb the higher cost of cotton bagging, as they did in 1938 in regions outside the South Atlantic seaboard.

III. CEMENT BAGGING¹⁹

A. TRENDS IN THE USE OF BAGGING MATERIALS

Between 1900 and 1924 nearly all the cement sold in the United States was bagged in cotton. That part which entered into the coastwise and foreign trade was put up in wooden containers. In 1924 the multi-wall paper bag was invented. This type of bag made rapid inroads upon the packaging field in general—a field which was previously monopolized by burlap and cotton.

During the last fifteen years cement has been sold in cotton and paper containers and in bulk. In 1925 nearly 84

¹⁷ Based on quotations of bag manufacturers for carload lots delivered in southeastern states.

¹⁸ In the 100-pound-bag size the osnaburg employed is 2.85 ounces, 36 inches wide, and cut to 39 inches; the burlap fabric is 10 ounces, 36 inches wide, and cut to 40 inches. In the 200-pound size the osnaburg is 2.05 ounces, 40 inches wide, and cut to 53 inches; the burlap is 10 ounces, 40 inches wide, and cut to 54 inches. The 74 per cent price disadvantage of cotton mentioned in the text is based upon Table 10 and is not strictly comparable for the size of fabric used in bag production.

¹⁹ Unless otherwise stated, the material for this section was obtained from Cheatham and Whitaker, *op. cit.*

per cent of cement shipments was made in cotton bags. In every year thereafter the proportion of cotton-bagged cement has decreased, until in 1936 the figure stood at 37 per cent. Paper-bagged cement is a different story. The proportion of cement shipped in this container has steadily risen from 10 to 40 per cent in the same period. Similarly, bulk shipments have increased, although somewhat irregularly, from 6 to 21 per cent of the total output.

The actual number of cotton bags employed decreased even more than these figures would indicate. These bags are usually returned to the manufacturer for re-use. For the period under consideration the Bureau of Agricultural Economics has calculated that the number of times each cotton bag was used increased from eight to twelve. Thus, as measured by the volume of cotton required to manufacture osnaburg for cement bagging, the consumption decreased from 70,000 bales in 1925 to 11,000 bales in 1936. This means that cotton cement bags required about half of the total output of osnaburg in the former year and only about 9 per cent in the latter.

B. COMPETITIVE FACTORS

1. *Cost of bags.*—During the period 1925–36 the price of cement was quoted on the basing-point system. When cotton containers were specified by the cement buyers, a differential of 10 cents per bag was added to the base price, with the stipulation that, if the bags were returned in good condition, the extra charge would be refunded. Bulk shipments were made at a discount from the base price of from 1.25 cents to 2.5 cents per bag. When paper containers were specified, the plusage differential was 3.75 cents per bag. Since this type of con-

tainer was not returnable, the paper-bagged cement was the most expensive.

The stability of the differentials in the face of widely varying prices for bags was remarkable. Cotton bags cost \$51.00 per thousand in 1925, reached \$61.00 per thousand in 1932, and thereafter rose to \$119.00 per thousand in 1935. The average cost during this time was \$107.42 per thousand. Paper bags cost \$50.00 per thousand in 1925, \$48.00 per thousand between 1926 and 1930, and \$38.00 per thousand in 1935 and 1936. Their average cost was \$43.58 per thousand.

Two observations on this situation might be made. First, the differential cement prices did not conform to changing bag prices. This was probably due to the disinclination of the manufacturers to change the premium for returned bags. A considerable amount of confusion, particularly in bookkeeping, would result in any effort to keep track of the conditions upon which each returned bag was originally sold. Second, the data, upon their surface, would indicate a greater cost of bagging in paper than in cotton. No cost studies exist which might throw light on this feature.

2. *Manufacturers' preferences.*—The fact that cotton bags may be re-used some twelve times means that the cement manufacturer can acquire the returned bags for the discount of 10 cents. Since the cost of new cotton bags during 1925–36 averaged 10.74 cents, it was clearly to the advantage of producers to offer the discount.

In a survey made in 1939 cement manufacturers professed no preference for any type of packaging.²⁰ They did

²⁰ Conducted by the writer. No changes were reported in the proportion of cement shipped in cotton containers. Perhaps the downward trend in their use has been stopped.

remark upon the fact that the use of paper bags eliminated complaints over lost or damaged cotton bags and that there might be some slight advertising advantage in paper containers. All stoutly maintained that orders specifying any of the three types of containers were cheerfully filled.

3. *Retailers' preferences.*—The retail cement dealers actively favor paper containers. Selling chiefly to small-scale consumers who take little care of returnable bags, they have run into considerable trouble in refusing allowances for cotton sacks which were damaged, wet, or torn.

4. *Consumers' preferences.*—Contractors who purchase cement in considerable volume generally have someone on the job to clean and bundle cotton bags. Consequently, these consumers usually enjoy the full return allowance and pay only the base price for their cement. Enterprises which consume cement in very large volume usually provide storage facilities and are the typical buyers of bulk cement. The large construction projects of the 1930's which were of prime importance in the building activity at that time were responsible for the increase in the proportion of cement shipped in bulk.

Cotton bagging suffers a price disadvantage in competition with bulk-shipped cement. This condition will not change so long as the price differentials remain. At the other extreme the cement used in very small volume and at irregular intervals, such as in repair work

about the home, will probably be packaged in paper. The slightly higher price is not significant in contrast with the nuisance of caring for and storing cotton bags until it is convenient to return them. Between these extremes, cotton-bagged cement has no peer.²¹ The quantity used will depend entirely upon the volume of building and construction work undertaken in the nation.

In the present and the preceding chapters the writer has explained, in so far as data were available, the trends in the domestic uses of cotton. In particular this analysis has shown the effects of intertextile competition upon the employment of cotton in the more important outlets for that fiber. The evidence is quite conclusive that Schultz was partially right in guessing that the decline in cotton consumption was due to the competition of rayon and silk.²² But it does more; it shows that wool is also an important competitor, and it lays bare the fact that cotton is not always the loser in these competitive struggles—that in many outlets it has successfully challenged the introduction of other textiles. Consequently, it is now apparent that the pessimism with which Schultz viewed the future consumption of cotton was ill founded. The future can rightfully be regarded with moderate optimism.

²¹ The recent use of ready-mixed cement is likely to change the situation on construction jobs of intermediate size. Examples would include street and sidewalk paving and large buildings.

²² See chap. i.

CHAPTER IV

THE FOREIGN MARKET FOR AMERICAN COTTON

IN TURNING the attention of the reader to the foreign market for American cotton, it is the purpose of the writer to delineate the chief features of this important segment of the demand for cotton, to indicate the trends in the volume of foreign consumption in the chief markets, and to analyze the forces which brought about the drastic changes of which Americans are so painfully aware. No attempt is made, in the present unsatisfactory statistical situation, to derive the foreign demand curve for cotton. The objective is to understand the forces which resulted in the sharp contraction of the foreign outlets for the domestic fiber.

Foreign markets for American cotton products have been one of the most influential factors in the development of the economic life of the United States. This was well understood in 1793, when Ely Whitney perfected his cotton gin; it was a dominating influence in the policy of Congress up to the Civil War; and, despite a record of ever increasing tariffs since then, cotton exports remained a most important source of foreign exchange. Even as late as 1932 the value¹ of cotton exports was 29 per cent of the cent of the value of total merchandise exports. The subsequent fall in the ratio to 11 per cent in 1939 serves to emphasize the plight of cotton in our economy. The

value of exported cotton manufactures is positively correlated with the value of noncotton exports. The fact that the value of the former increased 100 per cent between 1935 and 1939 is encouraging, even though it is true that this item has not yet equaled the 1920 figure. But cotton manufactures constitute a relatively small proportion of total cotton exports, since they varied between 27 per cent of the latter in 1920 and 9 per cent in 1935. The volume of raw cotton sold in foreign markets declined 13 per cent between 1920 and 1923. During the succeeding four years exports rose 79 per cent to reach 2,221,000 metric tons, the greatest volume in the twenty-year period 1920-39. With the exception of 1932 and 1933, exports never again reached the two-million-ton mark, and by 1939 they were 49 per cent of the 1927 volume.

While the decade of the 1930's was a disastrous period for cotton-growers and middlemen connected with the trade, it must not be assumed that the trend toward the eclipse of the United States as the predominating source of raw cotton began during that time. In fact, the trend was rather well established by 1910. The shortage of raw cotton in the world's markets—a shortage created by the Civil War—gave a permanent stimulus to the growth of this fiber in India and Egypt.² In the latter nation output tripled between 1870 and 1906. In the five-year period 1909-13 India provided

¹ The term "value" in this section refers to the deflated dollar export figures. Total exports were deflated by the all-commodity wholesale price index, while cotton exports were deflated by the textile products index of wholesale prices (U.S. Bureau of Labor Statistics, *Wholesale Prices* [Washington: Government Printing Office]).

² *World Trade in Agricultural Products* (Rome: International Institute of Agriculture, 1940), pp. 396 ff.

13.1 per cent of the world exports and Egypt 9.6 per cent. During the 1880's Russia annexed Turkestan and encouraged cotton production there by guaranteeing the purchase of the crop. The result of this competition from foreign sources was to reduce the share of the United States in world cotton exports to nearly 60 per cent in 1910. As is indicated in Table 11, the share of America remained rather stable from 1910 to 1933. Thereafter a steady decline set in, and by 1939 the United States accounted for only 40.7 per cent of raw-cotton exports.

Little came of the vigorous efforts to stimulate colonial production by other nations. Germany (prior to 1914), Belgium, Japan, Italy, Portugal, and Australia all tried to encourage cotton culture by subsidies, bounties, premiums, fixed prices, and preferential tariffs and freight rates. By 1931 prodigious efforts in the colonies of the United Kingdom, France, Japan, Belgium, Portugal, and Italy yielded an output amounting to only 2.5 per cent of the world production. The marked improvement in foreign sources of supply occurred in Egypt (including Uganda and the Anglo-Egyptian Sudan), Brazil, and Peru. In Egypt and Peru the relative increases in exports were stimulated by good prices. Japan received a grant of 2,500,000 acres of Brazilian land for the purpose of settling nationals who were encouraged to raise cotton. The success of this venture is attested by the rapid rise in cotton exports from Brazil.

The relative importance of the foreign markets for American raw cotton for the calendar years 1920-39 is shown in Table 12. Exports to Europe varied between three-quarters and seven-eighths of the total foreign sales of raw cotton during the 1920's. In the next decade the ratio fluctuated rather widely from year to

year but tended to settle around 67 per cent in the five last years. Losses in the markets of the United Kingdom and Germany accounted for practically all of this change. On the other hand, Asiatic and the relatively unimportant North and South American markets reported healthy gains. In every year except one since 1930 more raw cotton was sold in Asia than in any nation in Europe. Japan was primarily responsible. Outlets in Canada and in Central and South America expanded in the same degree that the volume of sales in the United Kingdom decreased. The fact that sales were made to forty-four countries in 1939 as compared with only thirty countries in 1920 further reflects the growing dispersion of American foreign cotton markets. And, incidentally, this scatter of markets is an important factor in the above-noted decline in the value of manufactured cotton goods exports. The manufacture of cotton goods is no longer as geographically concentrated as it once was. The example of a nation that had no cotton mills by 1939 was rare.

In addition to Japan and Canada, eight European nations accounted for 96.9 per cent of American raw-cotton exports in 1920. The identical nations took only 85.6 per cent of a greatly reduced volume of exports in 1939. In four of these nations—Sweden, Canada, Japan, and the Netherlands—the average volume of raw-cotton imports from the United States during the period 1936-39 exceeded the average volume of imports for the period 1920-23 by 85 per cent, 38 per cent, and 21 per cent, respectively. For comparable periods, the average for Germany declined 54 per cent, Spain 49 per cent, the United Kingdom 38 per cent, Italy 25 per cent, France 18 per cent, and Belgium 15 per cent. An analysis of the production and importation of

textile fibers by these nations serves to throw some light on their consumption trends and possibly upon the reasons for the decline in the physical volume of American raw-cotton exports.

Data referring to the Swedish production of fibers and to her imports of yarns and raw textiles are included in Table 13. The consumption of textiles appears to have remained at a stable level, the total volume of production and imports rising from 62,000 metric tons in 1926 to 76,000 metric tons in 1932. The cotton textile industry is the only one which shows an important degree of expansion. Raw- and waste-cotton imports doubled between 1922 and 1935, but the share of the United States rose only 43 per cent. Relatively unimportant though this market is, the inability of the United States to retain its position there reflects the operation of new competitive forces in the world cotton market.

The trend in Canadian textile consumption may be inferred from Table 14. Moderate expansion may be noted in both rayon production and raw-cotton imports. The latter were derived almost exclusively from the United States, particularly in the years since January, 1936, when the trade agreement between the two nations came into effect.³

Japan was the third market in which the percentage of raw-cotton exports from the United States expanded between 1920-23 and 1936-39. Her production and imports of textile fibers are shown in Table 15. Between 1922 and 1938 the total volume of domestic textile production rose 46 per cent. Flax, silk (chiefly for export), and especially rayon accounted for this improvement. The strides made in the woolen textile field are plainly evident in the rapid rise of

raw-wool imports and in the eventual elimination of wool-yarn imports. Cotton textile manufacturing, always predominant in the related industry group, required a rapid expansion in the importation of the raw fiber after 1924. The United States was one of the direct beneficiaries of this development. The percentage of raw-cotton imports derived from the United States rose in successive years from 26 in 1922 to 50 in 1928. The ratio dropped to 39 per cent in 1929 and 37 per cent in 1930, but in the next two years reached 62 per cent and 70 per cent, respectively. Thereafter the proportion dropped in successive years until it reached 25 per cent in 1937.

This radical change in the Japanese demand for American cotton may be traced, in part, to the attempt of the Japanese government to control its foreign markets. China was replaced by India as the best market for Japanese manufactured textiles in 1931.⁴ This occurred upon the heels of two developments. In the first place the year 1931 marked the beginning of the current Sino-Japanese war. As a result, the Chinese actively boycotted Japanese manufacturers. In the second place, the Japanese set about deliberately to displace British goods in the markets of India. This they had a good chance to accomplish. The Indian market requires huge volumes of low-quality cotton goods. This type Japan was particularly well adapted to supply. Short-staple fiber was obtained cheaply from the United States and China and manufactured at a very low cost. It was delivered at a competitive advantage in India, where British cottons, of higher quality, were formerly sold.

³ *Canada Year Book: 1941* (Ottawa: King's Printer, 1941), p. 392.

⁴ *World Trade in Agricultural Products* (Rome: International Institute of Agriculture, 1940), pp. 400 ff.

As a result of the Ottawa Agreements, India raised the duty on manufactured textile imports (except in the case of Britain) in 1932 and again in 1933. This action brought on a trade war with Japan which was settled in 1934. Japanese purchases of Indian cotton were tied to Indian purchases of Japanese-manufactured cottons, sales of the latter were limited to 400,000,000 yards in each cotton year, and Indian import duties on the Japanese product were reduced. Thereafter, Japan bought nearly half of her raw cotton from India. In 1937 the primary sources of raw cotton were India (44 per cent), United States (38 per cent), Egypt (5 per cent), China (2 per cent), Africa (2 per cent), and Korea (1 per cent).⁵ It is noteworthy that South American nations were entirely omitted. It is clear that Japan turned to other sources for raw cotton as a natural result of the tendency of totalitarian states during the 1930's to barter products for the purpose of obtaining and holding new markets.

In view of the current war with Japan, two factors are of particular interest. Her manufactured cotton exports increased from 1.4 billion square yards in 1928 to 2.7 billion square yards in 1935 and 1936.⁶ By 1938 they had receded 500,000,000 square yards. During this period Japan was expanding her textile manufacturing facilities for war purposes and in order to export cotton goods for the purpose of acquiring foreign exchange. Even the American market was

invaded by her low-quality cotton cloth until, by a "gentlemen's agreement," the volume of imports was limited to 700,000,000 square yards. It is more than probable that her objective in this instance was to acquire dollar exchange in order to purchase iron ore and machinery.

A second factor of interest lies in the record imports of raw wool and in rayon staple production. These trends are a direct indication of the steps taken to produce textiles for military purposes.

The Netherlands is the last of the four markets which reported a larger average purchase of raw cotton from the United States in 1936-39 than at the beginning of the period. The production and imports of raw and semimanufactured textiles are shown in Table 16. Between 1926 and 1938 the volume of domestic fiber production increased 37 per cent, the rise in the output of flax being most notable. Imports showed little tendency to increase after 1924. The proportion of cotton imports derived from the United States varied erratically between 44 per cent in 1923 and 84 per cent in 1932 but averaged only 35 per cent for the years 1935-38, inclusive. The Netherlands sought other sources for raw cotton.

In the case of Sweden and the Netherlands, the decline in the importance of the United States as a source for raw cotton during the 1930's may be in part traced to the adherence of these nations to the sterling bloc. Their national currencies were tied to the British pound as far as purchasing power was concerned, and this procedure made it easier to purchase raw cotton from India and Egypt, whose monetary systems were likewise related closely to London. Dollar exchange was definitely scarce, and the difficulty was not overcome by the conclu-

⁵ *Japan-Manchoukuo Year Book: 1939* (Tokyo, 1939), p. 397.

⁶ Data for the period 1924-35 are provided by the International Labour Office, *Economic and Social Problems*, Vol. II: *The World Textile Industry* (Geneva: League of Nations, 1937), p. 72. Partially parallel data covering the period 1920-38 are available in *International Trade Statistics: 1920-1938* (Geneva: League of Nations, 1928, 1931-39).

sion of the bilateral reciprocal trade agreements with the United States.

Attention is now directed to a consideration of the six principal markets which reported decreases in imports of American raw cotton. Among these, Germany showed the greatest decline. The record of her production and imports of textiles follows. The rapid increase in the production of flax, hemp, and rayon staple reflects the efforts of the National Socialist regime to achieve a greater measure of self-sufficiency in textile fibers. Domestic wool-growing could not very well be expanded in a densely populated area. The decline in raw-wool imports reflected the determination of Germany to rely upon rayon staple as a substitute. As rayon staple is a material which can be readily manipulated to produce textiles which have the appearance of woolen goods, German policy seized upon this characteristic. The manufacture of the substitute from readily available resources was greatly expanded, and the production of wool products declined. Also, domestic consumption of cotton goods increased, as is evidenced by the fact that total imports continued on the usual scale, but exports of this product declined between 50 and 67 per cent of the 1920 volume. Thus it is apparent that German policy was reflected in the clothing of civilians and military personnel in cottons and rayons. One has only to remember the inability of the German army to withstand the cold winters of Russia in 1941-43 to realize the costliness of this war program.

The data on raw cotton imports reported to the League of Nations appear to be gross underestimations. Erring somewhat less in this respect, the *Statistisches Jahrbuch für das Deutsche Reich* understates the volume of American imports anywhere from 36,000 metric tons

to 191,000 tons in each year between 1923 and 1937 inclusive, excepting only the year 1934. Using the German data in the *Jahrbuch*, the percentage of raw-cotton imports from countries of origin are shown in Table 18. There it may be clearly observed that American losses in the German cotton market were directly made up by purchases from Egypt, Turkey, and South America.⁷ The rapidity with which these new sources came to the fore was entirely due to the impact of Schacht's "New Plan" (1934).⁸ Under the clearing agreement with Brazil, 60 per cent (23,000 metric tons) of the latter's raw-cotton sales in foreign markets in 1935 went to Germany. Despite the fall in the ratio to 18 per cent in 1936 and 29 per cent in 1937, and the fact that Brazil terminated the agreement, the volume of imports from this source amounted to 39,000 metric tons in 1936 and 70,000 in 1937. The German market for American cotton declined during this period, and in 1939 sales amounted to only 11 per cent of the 1933 volume.

⁷ The explanation of the large volume of cotton imports from the United States during the 1920's would appear to revolve around the heavy loans which Americans granted foreign nations during that decade. Germany, greatly distraught from the ravages of the recent war, financed herself with foreign loans. Ezekiel reports the total annual investment of American capital in foreign securities as follows:

Year	Amount	Year	Amount
1920.....	\$ 571,000,000	1927.....	\$1,609,000,000
1921.....	303,000,000	1928.....	2,591,000,000
1922.....	294,000,000	1929.....	2,328,000,000
1923.....	435,000,000	1930.....	2,161,000,000
1924.....	364,000,000	1931.....	1,520,000,000
1925.....	551,000,000	1932.....	862,000,000
1926.....	1,326,000,000		

(see M. Ezekiel and L. H. Bean, *Economic Basis for the Agricultural Adjustment Act* [Washington: Government Printing Office, 1933], p. 34).

⁸ Hjalmar Schacht, "German Exchange Control, 1931-1939," *Quarterly Journal of Economics*, LIV (1940), 90 ff.

Into this record of the production and importation of textile fibers one can read the operation of a definite German policy. It is altogether probable that the early decrease in the purchases of American cotton was due to foreign exchange difficulties. But, as far as America was concerned, some of the elements in this problem were artificially created. It must be remembered that, while it is true that the United States continued its high tariff policy by passing the Hawley-Smoot tariff bill and thus made it difficult for Germany to sell goods in this country, it was the German government which moved for the cancellation of the commercial treaty between the two nations and consequently decreased still further its opportunity to acquire dollar exchange. Furthermore, by a policy of entering upon clearing agreements with other nations, Germany killed all possibility of buying American cotton through the device of three-cornered trade.

Another development which clearly shows itself in these data is the definite procedure of getting ready for war. It will be noted that the total cotton imports were not decreased but that the country of origin was shifted from the United States to Egypt, Turkey, and Brazil. It requires very little imagination to see that Germany planned to acquire control of Egyptian and Turkish sources through military and diplomatic activity and that, while she would not be likely to continue long to purchase Brazilian fiber, she could make the German cotton market so important to that Latin-American nation as to guarantee that the latter could give the United States little aid and comfort in time of war. Indeed, the hope was very real that inroads upon the wartime co-operation of the members of the Pan American Union would present a real deterrent to the

effective prosecution of the war in case the United States should become a belligerent.

The production of textile fibers in Spain was largely confined to wool and hemp. Rayon output never exceeded 3,400 metric tons—the volume in 1935—and declined to 500 metric tons in 1938. Silk production was 100 metric tons in 1926 and declined to only 10 tons in 1939. The wool clip amounted to just under 40,000 tons in 1923, but in the succeeding years a gradual decline set in, until the output was only 27,200 metric tons in 1938. Hemp was the most important domestic textile. Output, however, declined from 81,000 metric tons in 1925 to 15,000 in 1931. During the next four years a recovery to 48,000 metric tons was achieved. Imports of raw silk gradually rose from 1,000 metric tons in 1922 to 7,900 tons in 1935, while purchases of wool and manufactures thereof from foreign sources averaged 5,000 tons between 1926 and 1935. Imports of raw cotton varied between 75,800 metric tons in 1928 and 106,800 tons in 1932. The average for the period 1922–35 was 84,000 tons. Of this total, an annual average of 67,000 metric tons was derived from the United States. Purchases from this source were steady up until 1936. Thereafter the war in Spain cut heavily into the American cotton market. No imports from the United States were recorded in 1937, and only 70 tons in 1938. The loss of this market would appear to be temporary in view of the recovery to 45,000 tons in 1939.

As is indicated in Table 19, the domestic production of textiles in the United Kingdom during the period 1920–39 was confined to flax, wool, and rayon. The output of flax was highly variable but showed a tendency to decline in the 1930's. On the other hand, a healthy in-

crease may be noted in the wool clip between 1922 and 1933. Most of this gain was held in the following years. Rayon production improved slowly. Wool imports were maintained in steady volume. Imports of raw cotton averaged 112,000 metric tons less in the 1930's than in the previous eight-year period. During the latter period the United States was the primary source for two-thirds of the volume. In 1929 the proportion fell to half, and after 1934 America had difficulty in maintaining 40 per cent of that market. As Table 20 shows, the United Kingdom purchased relatively more cotton from India and Brazil and less from Egypt and the United States. It is reasonable to assume that the shift in the source of supply of raw cotton was a direct result of the operation of the Ottawa Agreements of 1932. The result of this conference was to encourage inter-Empire trade, and a real effort to implement the agreements was made. In part, there may have been the additional reason of Japanese competition in India to persuade the British to operate more vigorously in that Asian market. In any case, the net results were undoubtedly observed with much satisfaction by the British Cotton Growing Association, which had labored long for this result.

One general remark on the over-all picture of the British textile industry may be made here. The failure to push the manufacture of rayon staple is in marked contrast with the records of Germany and Japan. The difficulty of securing raw material was surely less than that which faced Japan. It is debatable whether the primary reason was a will to peace, a supreme confidence in the ability of the British fleet to retain control of the seas and thereby make certain the foreign sources of cotton and wool, or simply the great political power of the cotton and

wool textile interests. Probably all three were active forces and should be weighted in the order named. But, whatever the correct explanation, the net results were very disastrous. After four years of war England is still fighting for her life against submarine blockade. Were it not for the aid of the United States, another and very different story might well have been written.

The domestic production and importation of textile fibers by Italy are indicated in Table 21. The production of hemp greatly overshadows all other domestic textiles. Interesting to observe are the Italian efforts to raise cotton. As compared with Germany and Japan, the production of rayon was relatively small, doubtless a reflection of the difficulties involved in the industrialization of the state. Imports of wool more than doubled between 1922 and 1933, but they fell off to their former level in the succeeding years. Total imports of cotton held up rather well until 1934. The decline during the period 1934-38 was probably the result of the expansion in rayon output. The percentage of raw cotton derived from the United States varied without trend between 89 per cent in 1932 and 58 per cent in 1938 and averaged 74 per cent during the seventeen-year period. Between 1929 and 1937, Italian purchases from Egypt rose from 9.8 to 17.8 per cent of total imports. For the same period the relative share of India and Ceylon fell from 19.7 to 10.6 per cent.⁹ America's losses in this market were not due to competing cotton from other primary sources; they were due to the Italian self-sufficiency program.

Italian experience in the export market for cotton manufactures was the exact replica of British trends. In both nations the volume of exports during the

⁹ *World Trade in Agricultural Products*, p. 412.

1930's declined to half the volume of the preceding decade. After allowing for some substitution of rayon products for cotton in the domestic Italian markets, the record indicates that both Italy and the United Kingdom must have been making some progress in the clothing of the populations and thus increasing their real incomes.

Although the production of textile fibers in France declined from 521,000 metric tons in 1925 to 385,000 tons in 1938, nearly all the change was attributable to silk production. The wool clip increased about 5,000 metric tons during this time, and the rayon industry grew up to contribute 32,500 metric tons. There was no clearly defined trend in flax production. Cotton and wool comprised nearly all the raw textile imports, the former averaging 313,000 metric tons and the latter 287,000 tons for the period 1922-35. Despite the lack of trend in total cotton imports, the proportion derived from the United States tended to decline from two-thirds to one-half. Between 1922 and 1925 inclusive, France purchased 65 per cent of her raw cotton from America; during the last five-year period (1931-35) the proportion dropped to 54 per cent. France turned to Egypt, India, and Brazil. Between 1933 and 1937 the proportions of total cotton imports contributed by these countries rose 5.2 per cent, 3.0 per cent, and 4.7 per cent, respectively, while purchases from the United States fell 13.7 per cent.¹⁰ In the free French market American cotton exporters were unable to hold their position. This cannot be attributed to any trend among French mills to use long-staple fibers. This could not account for the greater use of Indian and Brazilian cotton. It is more probable that the

scarcity of dollar exchange was responsible.

Belgium produced very little of her textile fiber requirements between 1922 and 1939. The wool clip varied between 300 and 400 metric tons; rayon manufacture was as high in 1927 (7,500 metric tons) as it ever again reached. Flax-raising, however, was an outstanding source. Output declined from 349,000 metric tons in 1926 to 117,000 metric tons in 1934 but reached 467,000 tons in 1939. Considerable quantities of flax were also imported. Wool imports moved rather erratically between 66,000 metric tons in 1925 and 125,000 tons in 1935. Imports of raw cotton increased rather steadily from 61,000 metric tons in 1922 to 114,000 tons in 1935. Unfortunately, the same cannot be said for American raw-cotton exports to this market. The ratio declined from 65 per cent in the first five years of this period to 36 per cent in the last five years. Meanwhile, Belgian purchases from the Congo rose from 6 per cent in 1929 to 21 per cent in 1935, the fruition of the long-run program to produce empire products.

A summary of the trend in sales of American raw cotton in ten leading markets is shown in Table 22. The data are in the form of percentages of the total importation of raw cotton derived from the United States. With the exception of Canada and Italy, the ratio of American sales in all leading markets tended to decline quite irrespective of whether the absolute volume rose or fell.

The total consumption of raw cotton appeared to have risen in Sweden, Canada, Japan, the Netherlands, and Belgium. A shift from the United States to other primary sources occurred in every case except that of Canada. French consumption remained about the same, but nevertheless that nation shifted from the

¹⁰ *Ibid.*

United States to Egypt, India, and Brazil. In the case of Germany and Italy, slightly less raw cotton was apparently consumed, but in the United Kingdom little change is noted. Relatively, the American market in Italy was undisturbed, but the United Kingdom shifted to India and Peru, and Germany resorted to every other primary source except the United States.

Cotton consumption in Germany, Italy, Japan, and England appeared to be adversely affected by competition with rayon and, in the case of the latter two nations, by the growth in local manufacture of cloth. As in the United States, the production of small quantities of rayon was probably reflected in a lower consumption of silk. But, as rayon output expanded, it displaced cotton in many uses. If it were assumed that 80 per cent¹¹ of a nation's rayon production takes the place of cotton, then an average of 161,000 metric tons of cotton were annually displaced in Japan during the period 1935-39, inclusive, 132,000 tons in Germany, 86,000 tons in Italy, and 54,000 tons in the United Kingdom. In each of these cases imports of raw cotton from the United States declined somewhat more than the above tonnage. It is reasonable to conclude that rayon competition was an important factor in the loss of American cotton markets in these nations.

These trends away from the United States were not due, as was contended by Bennett S. White, Jr.,¹² to the disadvantageous dollar exchange rates between 1931 and 1933. The trend continued through 1938. Imperialistic schemes to

further foreign cotton production and clearing agreements (as far as cotton was concerned, the most successful of which was between Germany and Brazil) have had only a small share in depriving the United States of part of her foreign markets. Japan did have a small part in this trend when she directed the purchase of raw cotton to India and other Asian sources. But the United States could not maintain her position even in the free markets. It has sometimes been asserted that this has resulted from the progressive deterioration in the quality of her crop. The answer to this argument can be readily determined.

The quality of cotton manufactures depends directly upon the staple length of the raw fiber. While the short fiber serves very well in the production of low-grade yard goods such as Japan specializes in, better-grade products, and those such as tire cord which require high tensile strength, must be manufactured from longer staple. American Sea Island, Egyptian, and Peruvian cotton are famous for their long staple. Practically none of the former has been raised in the United States for many years (the 1939 output was only 2,900 bales). Consequently, Egyptian and Peruvian cotton are much in demand. On the other hand, Indian, Chinese, and Brazilian cotton is typically short staple. In fact, German cotton mills had great difficulty in adjusting themselves to the manufacture of the large amounts of Brazilian cotton which were imported between 1936 and 1938.

The contention that the short-staple cotton produced in the United States is a further reason for the loss of foreign outlets is based on the assumption that, since the staple length of the American product is progressively deteriorating, foreign manufacturers are forced to turn

¹¹ A gross estimate based upon American experience during the 1930's.

¹² "The Shrinking Foreign Market for United States Cotton," *Quarterly Journal of Economics*, LIV (February, 1940), 255-76.

to such primary sources as Egypt and Peru. Even if the assumption were true, the cotton mills of the world could not rely upon the very limited outputs of long staple in these countries. They reported only 8 per cent of the world output in 1939. In fact, however, the assumption is untenable. Fiber length was typically short between 1880 and 1920, but a consideration of Table 23 shows that the staple length of domestic cotton has been gradually increasing. Seventy-six per cent of the American crop was less than one inch in length in 1930. Such a large proportion of short staple was indeed disastrous from the point of view of the grower's income. The development was directly due to the incursions of the boll weevil between 1920 and 1922. This pest rendered large areas of the southeastern United States relatively unsuitable for cotton culture, and a shift was made westward. The average acreage planted in 1916-20 and in 1926-30 showed no relative change in Louisiana, Mississippi, and North Carolina, but it rose 6 per cent in Texas, 2 per cent in Oklahoma, and 1 per cent in Alabama and in Arkansas. Georgia reported a decrease of 6 per cent and South Carolina 3 per cent. Approximately 20 per cent of the world crop in 1930 was over one inch in length, and yet the United States produced three-fifths of this.¹³

Table 23 shows convincingly that efforts to train American cotton-growers in

the cultivation of longer staple have been materially rewarded. By 1939 the proportion of the domestic crop which was over one inch in length was 49 per cent. In that year 33 per cent of the world production was over one inch in length, and the United States accounted for three-quarters of it.

In every case, however, that part of the world production over one inch in length which was contributed by Egypt was definitely superior to almost all of the American crop. The staple length of the Egyptian carry-over varied between $1\frac{1}{8}$ and $1\frac{3}{4}$ inches, and after 1937 the bulk of the crop consisted of staple between $1\frac{1}{4}$ and $1\frac{5}{8}$ inches. Egyptian cotton is definitely in a class by itself. American production of cotton over $1\frac{1}{4}$ inches in length in 1939 was only 2 per cent of the Egyptian crop. Nearly all of the Peruvian crop varied between 1 and $1\frac{1}{4}$ inches. Thus, the United States probably produced at least as much staple $1\frac{1}{4}$ inches in length as Peru and many times more staple than that nation over an inch in length.

This discussion of staple lengths leads inevitably to the conclusion that the experience of American cotton exporters in the world markets during the 1930's, and particularly after 1934, was not due to progressive deterioration in the quality of the crop. As in the case of such contentions that the United States cotton markets in foreign countries declined due to colonial policy, barter and clearing agreements, and foreign exchange ratios (between 1931 and 1933), the argument relative to the decline in staple length is found to be without foundation in fact.

¹³ This percentage was arrived at from reports on the staple length of the American crop and on the staple length of foreign growth of the carry-over (U.S. Department of Agriculture, *Agricultural Statistics: 1941* [Washington: Government Printing Office, 1941], pp. 129-30).

CHAPTER V

THE EFFECT OF GOVERNMENTAL POLICY ON THE DEMAND FOR AMERICAN COTTON

IT WAS concluded from the study of the changes in the relationship of the factors in the equation of demand for cotton that domestic conditions have increased in importance as the price-determining factor while foreign conditions have decreased in weight. To find an explanation of these changes, it is necessary to consider the results of federal agricultural legislation since 1920.

The new administration which took office in March, 1933, inherited a serious farm problem from the reconstruction days following World War I. As the result of a productive capacity far too great at profitable prices for peacetime needs, a crippling tariff policy, and growing competition from foreign producing areas for the world's markets, the agricultural interests of the United States turned more and more to federal aid for the solution of their problems. The Capper-Volstead Act was passed in 1922 for the purpose of encouraging co-operatives to organize and combine in the marketing of farm products, but this effort was obviously inadequate to solve the several causes of distress.¹ Farmers turned to McNary-Haugenism in the succeeding years. Secretary Wallace described this plan in the following words:

The essence of the McNary-Haugen idea was that farmers were to be given the centralizing power of the federal government so that they could dump enough of their surplus abroad

to raise prices in the domestic market. The loss on the stuff dumped abroad was to be paid by the farmers themselves by means of an equalization fee. In some versions the price was to be raised so that production of export crops could enjoy the full benefit of the tariff. In other versions the criterion was a price to be raised until it was as high relative to prices of things purchased by farmers as prevailed during 1909-14.²

The farm bloc was able to have the bill passed twice by Congress, but in each instance it was vetoed by President Coolidge. In 1929 the Agricultural Marketing Act was passed. It not only encouraged the co-operatives to combine for the enhancement of prices but authorized the Federal Farm Board to finance redundant supplies of the more important crops in order to keep them off the market. This unsuccessful stabilizing effort was outlawed by executive decree in 1933, and we entered an era of unprecedented federal control of agriculture.

Through the unconstitutional Agricultural Adjustment Act of 1933, the Soil Conservation Act of 1935, the Soil Conservation and Domestic Allotment Act of 1936, and the Agricultural Adjustment Act of 1938 the Congress has attempted to tread a legal path along which federal power may flow to the solution of the farmers' economic problems.³ Two general observations on this

² Henry A. Wallace, *New Frontiers* (New York: Reynal & Hitchcock, 1934), pp. 147-48.

¹ E. G. Nourse, J. S. Davis, and J. D. Black, *Three Years of Agricultural Adjustment Administration* (Washington: Brookings Institution, 1937), p. 16.

³ For an explanation of these laws see the annual reports of the Secretary of Agriculture, and Nourse, Davis, and Black, *op. cit.*

legislation may be made here. For political reasons, no doubt, the early laws were thought generally to be emergency efforts and, therefore, short run. But in more recent years the trend undoubtedly has been to consider federal legislation to be a permanent part of the economic organization.⁴ Furthermore, early attitudes indicated a desire to solve the farm problem from the broad view of social interests, but latterly there has been a tendency to look at the solution from the narrower view of agricultural interests. The second general observation is that many new weapons were forged in the attack on the vexing situation. These included production control, parity price and parity income payments, crop loans, and export subsidies.

Cotton was one of the major crops treated under the authority of the above legislation. Too late to come under the acreage controls provided for in the act of 1933, producers were induced by rental payments in cash, or by the combination of cash rental payments and options on cotton held by the government, to plow up 35.1 per cent of the acreage.⁵ In the years following 1934, contracts with growers provided for production control. Partly for this reason, the number of acres in production dropped from an all-time high of 45.8 million in 1926 to 27.9 million in 1934. In the three succeeding years a steady rise to 34.1 million acres was allowed. On July 1, 1939, only 25.0 million acres were bearing cotton. But the restriction of acreage does not give a true index of crop control, for it fails to consider the yield on the harvested acreage. In 1934 this figure stood at 171.6 pounds per acre, and thereafter it steadily rose to

the all-time high of 269.9 pounds in 1937.⁶ The average annual yield during the crop years 1936-39, inclusive, was 30 per cent greater than the average annual yield for the period 1929-35, inclusive. Total yields are dependent upon acreage planted, weather, and the fertility of the soil. The production control programs dealt only with the first factor. Weather must always remain a random force. But farmers tend to improve upon the natural fertility of the soil by applying artificial plant food and by cultivating more intensively the restricted acreage allotted to them. The above-noted increase in the average annual yield of cotton is directly traceable to the soil conservation program.

The objective of the Agricultural Adjustment Act of 1933 was gradually to re-establish parity prices for basic agricultural crops, including cotton.⁷ The Agricultural Marketing Agreement Act of 1937 added to this basic formula the requirement that interest and taxes on farm real estate be taken into consideration in determining parity prices.⁸ The Agricultural Adjustment Act of 1938 included the injunction that parity income as well as parity prices be achieved gradually.⁹ In addition were the specific provisions that loans, varying between 52 and 75 per cent of parity, be made to cotton co-operators under the Adjustment Act if the existing price were below 52 per cent of parity when the August crop estimate was in excess of the normal requirements for domestic consumption and export trade.¹⁰

⁶ U.S. Department of Agriculture, *Agricultural Statistics: 1940* (Washington: Government Printing Office, 1940), p. 109.

⁷ *United States Code*, sec. 602(1).

⁸ *Ibid.*, Supp. V, sec. 602.

⁹ *Ibid.*, sec. 1301(a).

¹⁰ *Ibid.*, sec. 1302(c).

⁴ *Ibid.*, pp. 27-31.

⁵ The base for this percentage was the average acreage for the years 1928-32.

The policy of granting crop loans was designed to place a floor under prices, while benefit payments were made to producers to help make up the difference between existing prices and parity. The result of this program may be observed from Table 24.

The acknowledged success of the Administration in raising the farm price of cotton in the four years following 1932 is unquestionably due to the policy of holding loan cotton off the market. Little credit should be given to the poor weather conditions in 1934 and 1935, because the relatively short crops of those years were more than balanced by the unprecedented carry-over stocks.

The lower loan value for 1937 probably was adopted in the face of continuing heavy carry-over and prospective bumper crops. For the last two years the loan value was fixed by the terms of the Agricultural Adjustment Act of 1938. As noted above, the cotton-growers were well on their way to producing record yields per acre. The beginning-of-the-season carry-over decreased from 7.2 million bales in 1935 to 4.5 million in 1937. It would not be a sound policy to jeopardize the improvement in the statistical position of cotton by maintaining loan rates of 10-12 cents. As it was, the record crop of 1937 added over seven million bales to the carry-over in the next year and forced farm prices back to lower levels than they had touched since 1932. The recipients of the loans were not tempted to liquidate them in the face of a market price which failed to cover principal, interest, and warehousing expense.

The liquidation of loan cotton has continued to be a knotty problem. Nourse, Davis, and Black surmised that most of the fiber pledged under the 10-cent rate of 1933 was repledged under

the 12-cent rate in 1934.¹¹ They report that on January 15, 1937, there were 2,994,177 bales in warehouses as security for 12-cent loans and only 26,120 bales pledged under the 10-cent rate. Consequently, 45.4 per cent of the loan cotton either was liquidated or was owned outright by the Commodity Credit Corporation on that date. As late as July 31, 1941, the Corporation reported that it owned 1,348,161 bales of the 1934 crop. On the same date loans were outstanding on 605,460 bales of the 1938 crop, and the Corporation owned 4,778,321 bales of the 1937 crop.¹²

The effect of the cotton program on the foreign market—of primary interest here in explaining the change in the relative importance of the domestic and foreign supply on the United States price of cotton—may be discerned by comparing the prices of a comparable grade of American cotton in the domestic and Liverpool spot markets and by noting the change in the flow of export cotton. The average price in ten United States markets tended to decline after 1923. During the crop years 1930-32, inclusive, prices were extraordinarily low despite the early efforts of the Federal Farm Board to maintain them. The success of the price-raising activities of the federal government in the period of 1933-36 is apparent. The price spread between United States and Liverpool markets averaged 2.23 cents per pound between 1920 and 1928 inclusive. The differential dropped slightly during 1929-31, when the Federal Farm Board was in operation. From the low point of 1.37 cents reached in 1932, the spread increased to an average of 1.89 cents for the period 1933-39 inclusive.

¹¹ *Op. cit.*, p. 168.

¹² Commodity Credit Corporation, *Statement of Loans and Commodities Owned, July 31, 1941.*

The relation between the prices of foreign cotton delivered in Liverpool and the price of American cotton in the ten spot markets is shown in Table 25. The grades of each foreign product are not comparable to the American $\frac{7}{8}$ -inch fiber, the Indian and Brazilian product being of lower quality and the remaining two being of higher quality. However, the trend of the price of each foreign type can be discerned in its relationship to the annual average prices of American cotton. In a free market in which the demand and supply of various grades show either no change or an equal change, the above price trends should bear a constant relationship to the American price.¹³ In the case of the Indian cotton these conditions appear to have been fulfilled between 1926 and 1932. During the next seven years the price relatives rose to much higher levels despite the sinking spell encountered in 1935-36. The tendency to decline at that time may have been due to the large exports to Britain which were noted in Table 19. Meanwhile, Indian production and exports both expanded. American exports decreased throughout the whole period. This record implies that the decline in American exports was the principal factor in the relatively higher price level for Indian cotton, while contributing factors were the response of Indian production and exports to the higher prices and the important Japanese market for this fiber.¹⁴ In other words, American policy certainly rebounded to the benefit of Indian cotton.

¹³ Assuming no change in relative demands and relative costs (including transport).

¹⁴ This last factor is really more important than the phraseology would imply. In view of the changes in the economy of Japan (and also of Germany) during the 1930's, it is questionable whether those countries would have purchased more American cotton in the absence of price control.

The Liverpool price of Brazilian cotton tended to retain a stable relationship with the price of American cotton up to 1935. The chief reason for this is that the volume of Brazilian production and exports, despite their rapid growth, was small as compared with American cotton and consequently had little effect upon the market price. It is entirely probable that Brazilian prices were definitely tied to American cotton prices for this reason. The decline which set in during the last six years of the period may be attributed to the large increase in the volume of Brazilian cotton received in Liverpool. This change was noted in Table 19.

The relative price of Egyptian uppers apparently had no clearly defined trend. The price changes were surprisingly well (and positively) correlated with the percentage change in production and exports.¹⁵ Peruvian price relatives behaved similarly. The price relatives of each cotton type, as shown in Table 26, bear a striking relationship to each other. On close examination it appears that Egyptian cotton reached lower levels, relatively, and recovered less quickly than did American cotton. Peruvian cotton suffered the least serious price decline, and the Indian and Brazilian cotton price trends show close adherence to the trend of American cotton prices.

¹⁵ Production data were as follows (in 1,000 bales):

Year	Egypt	Peru	Year	Egypt	Peru
1926.....	1,586	246	1933.....	1,777	278
1927.....	1,261	246	1934.....	1,566	342
1928.....	1,672	225	1935.....	1,769	393
1929.....	1,768	303	1936.....	1,887	402
1930.....	1,715	271	1937.....	2,281	376
1931.....	1,323	234	1938.....	1,728	396
1932.....	1,028	242	1939.....	1,801	378

(Source: U.S. Department of Agriculture, *Agricultural Statistics: 1941* [Washington: Government Printing Office, 1941], p. 119.)

This analysis leads to the conclusion that American cotton was not sold in the Liverpool market at a price which its statistical position might warrant. That part of the United States crop which was exported was sold at prices which compared as favorably with the prices of foreign cottons during the period 1933-39 as during the period 1926-29. Hence to this limited extent the policies of the federal government in respect to cotton

from the United States declined sharply between 1933 and 1934 and continued the trend after 1935. The fact that large quantities of American cotton were withheld from the foreign market proved a powerful stimulus to foreign production. So rapid was the increase that the world carry-over (exclusive of American cotton) became threateningly large. This tended to curb production in 1938 and 1939. Furthermore, the consumption of

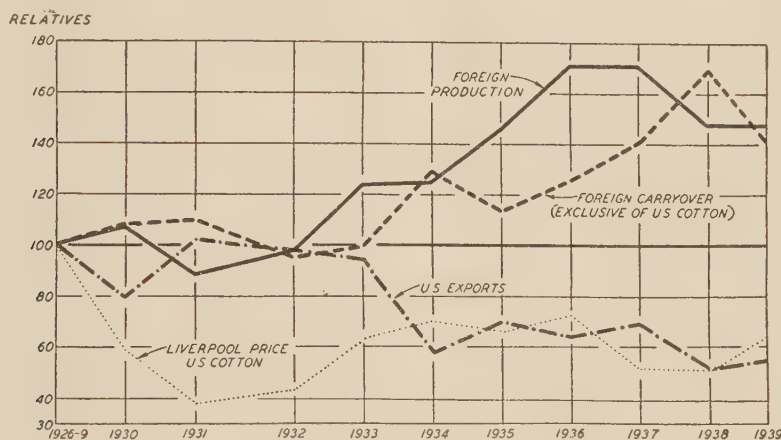


FIG. 1.—Factors in the decline of the foreign market for American cotton (1926-29=100)

production and marketing did not affect the foreign market. If, however, cotton exports had been maintained at their 1926-29 level, the foreign market price would definitely have been broken. What happened was that export cotton was fed into the foreign market in quantities which could be absorbed at prices which did not threaten to impair the subsidy and loan-protected domestic price and which did not disorganize the world market for cotton.

The results of this policy are plainly discernible in Figure 1. The spot price of American cotton in Liverpool rose in 1933 and was maintained well above the 1931-32 level for the six succeeding years. At the same time exports of cotton

foreign cotton averaged 59 per cent greater during the period 1936-39 than in the years 1926-29. For comparable periods, the foreign consumption of American cotton declined 19 per cent. The point seems clear that the effect of the federal policy was to withdraw American cotton from foreign markets and, in effect, hand those markets over to foreign producers. Domestically, the government was not able to raise prices to their 1926-29 level. The total revenue of American cotton-growers declined during the 1930's as compared with the previous decade, while the total revenue of foreign cotton-growers rose. The federal policy should have been appreciated by the producers of this fiber in foreign lands.

In an attempt to evaluate the cotton policy of the federal government, it is necessary to consider some of the basic assumptions of the economic organization. In accordance with the principles of *laissez faire*, any interference by federal authorities in the production and distribution of cotton must be disapproved. The proper way to eliminate surpluses which exceed normal carry-over is to allow price to fall to the point where the market, international in this case, will be cleared. Had such a policy been followed, the United States would have entered the war with insufficient stocks; the "surplus" would have been in the hands of the enemies of America. *Ex post facto*, this would be recognized as a catastrophe.

The question arises as to whether the unnamed assumption of world peace, one of the conditions of *laissez faire*, is really reasonable; whether reliance may be placed safely in an economic system which may put a nation's life in jeopardy. As a practical matter, the answer must be in the negative. The providential stocks of cotton which were on hand for use in the production of war goods in the years 1940-42 were nothing but a cause for alarm in 1939. The administration in power in the 1930's built better than it knew.

A practical policy¹⁶ involves the main-

¹⁶ This discussion implies that, in the writer's opinion, the safest policy for the United States to follow is one of national self-interest. To some readers this may appear to be merely old-fashioned nationalism. And yet the record of international co-operation is not one that encourages confidence in the future ability of the world's nations to settle economic problems with neighborly good will. While sharing the sentiment that permanent elimination of international strife is the great desideratum and that reasonable measures designed to achieve this end should be supported, natural caution suggests that the military security and social welfare of the nation should not be sacrificed in the interim.

tenance of stock piles to be drawn on whenever supply fails (the ever-normal-granary idea), as in the case of short crops, or when demand sharply increases, as in time of war.¹⁷ But the practical problems which arise in the administration of such a policy are very impressive in a democracy. As the surplus becomes large, vested interests are created. It is to the interest of growers, middlemen on the long side of the market, and manufacturers to see that surpluses remain unliquidated because they are a positive menace to the price structure. This situation creates a political problem of the first magnitude, and in the United States there is no assurance that a "cotton" pressure group may not have its way. The national safety certainly justifies the accumulation and management of stock piles, but the gains from this policy must be balanced against the dangers of creating an uncontrollable vested interest.

The foregoing dilemma leads to the consideration of a plan for the international control of cotton production and exports. Precedent may be found in the international sugar and rubber agreements. The world conferences on the plight of sugar producers resulted in voluntary agreements to control production in particular nations within a pre-arranged percentage of the world crop. Enforcement depended entirely upon national good faith, and this virtue the nations possess in varying degrees. Almost invariably the agreements were sooner or later broken, and the program fell through. On the other hand, the rubber agreement between England and the Netherlands was, and to our great cost in the present war, quite successful. In this case the problem was much

¹⁷ This idea was introduced into the Soil Conservation Act of 1937.

easier of solution because fewer variables were present.

The cotton and sugar cases are similar. Many nations are involved; many nations consider cotton and sugar culture an economic and military necessity and thus justify bounties, subsidies, and guaranteed markets. While the plan does not exclude the possibility of accumulating war stocks, the self-interest of the nations (a phrase which describes the net resultant of political pressure by growers, military ambition, and plain national pride) augurs ill for the success of programs of this type.

From a social point of view, a plan of this type is unsupportable because the basic assumption is that the demand for cotton is static. This is not true for several very good reasons. The foregoing chapters serve to underline the important fact that cotton faces severe competition from other fibers. And, in addition, there are many unprobed markets among the teeming millions in Asia and among the poor of all lands. From the purely economic point of view, the plan confirms a share of the market to high-cost producers.

These methods of dealing with the cotton question run the gamut of free enterprise to the strictest type of national and international control. In each case there is more or less merit and less or more shortcomings. In such a situation any monistic solution is untenable. A middle-of-the-road policy (too often the curse of the learned) is advocated as the best course in the present state of the political and economic development of the world. If only economic considerations were involved, the system of free enterprise would be the logical and practical solution. But it is literally impossible to lose sight of all the considerations usually grouped under

the term "social." These run the gamut of national preservation, relief during cyclical depressions, and the economic education of those engaged in agriculture. It is true that these elements are tossed about unreasonably in political strife and that their democratic handling up to the present leaves much to be desired. But the great virtue of the democratic way is that the people can change masters; as free enterprise has developed they cannot.¹⁸ And there is nothing to prevent a democracy from learning how to regulate economic activity by political means.

This proposal for government control does not imply that the degree of it should never change—quite the contrary. The conditions under which people live change from year to year, decade to decade, and century to century. Changing conditions definitely call for changes in the extent to which a government should go in directing production, exchange, and consumption. Only the objective should be the same: to influence the direction of events so as to approach the nation's optimum social welfare.

From the analysis of the forces which have operated against the foreign consumption of American cotton the conclusion is apparent that the domestic policy of the federal government was by far the most important. The competition of rayon in the German and Japanese markets and the bilateral trade agreements of these nations were contribut-

¹⁸ There is considerable evidence on this point. Note the failure of antitrust (monopoly) legislation; the abuses of the corporate form of (legal) business organization wherein management dominates and is relatively independent of stockholders; and the steady fall in importance of small-scale business in many fields of activity. For the best summary of these developments see C. W. Wright, *Economic History of the United States* (New York: McGraw-Hill Book Co., Inc., 1941), chap. xxxiii.

ing, but much less important, factors. By 1939 the foreign market for American cotton appeared permanently impaired. The realization of this impasse forced

the federal government, cotton-growers, middlemen, and manufacturers to reconsider the problem and think in terms of the potential demand for this fiber.

CHAPTER VI

THE POTENTIAL DEMAND FOR AMERICAN COTTON

REFLECTION upon the problems raised in chapter i is particularly invited at this point. Professor Schultz was especially disturbed by the decline in the demand for American cotton, a phenomenon which he attributed to the competition of rayon and silk. An analysis of domestic cotton markets showed that the competitive problem was much more complex than he inferred. The consumption of cotton actually increased in the mills producing cotton goods, lace, cordage and twine, and woollens and worsteds. In these industries there is little evidence that other textiles were harmed by this development. One possible exception was wool. Cotton consumption clearly displaced wool in the felt mills. On the other hand, intertextile competition had an adverse effect on the consumption of cotton in the cotton small-ware mills, the knitting industry, the carpet and rug industry, and in the silk and rayon mills. In these outlets rayon, silk, and wool clearly gained at the expense of cotton, and rayon at the expense of silk and wool. As far as the employment of cotton was concerned, the net effect of these competitive forces was that mill consumption of raw cotton in the production of clothing and industrial goods failed during the 1930's to recover the levels reached in the 1920's. Only in the output of household products was a new high level attained.

Probably because his statistical study was carried only to 1932, Schultz failed to inquire into the forces affecting the foreign demand for American cotton. Had he been able to foresee the revolutionary changes in these markets, he would indeed have been disturbed. In the foregoing chapters it has been clearly set forth that the foreign market greatly declined in importance because the depression of the 1930's in the United States led to a program of government interference in the production and marketing of cotton which adversely affected our foreign outlets, and because certain foreign authoritarian governments decided upon a program of self-sufficiency in preparation for war.

With this understanding of the effect of intertextile competition on domestic cotton consumption, and of the forces affecting the foreign market for cotton, it is pertinent to consider the near-term potential demand for the American fiber. This is a vital matter which concerns a substantial part of our population directly and all the population indirectly.

I. POTENTIAL FOREIGN DEMAND

It is rather obvious that the trend of economic forces during the 1930's could lead only to a tremendous upheaval in international and domestic economies. The "peace" of that decade was marked by strenuous diplomatic and economic struggles and by war in China, Spain,

and Italy. The war which began in 1939 may properly be looked upon as a continuation of earlier rivalries. In the economic field the central note was the increasing degree of governmental interference in production, marketing, and consumption with the inevitable result that the volume of trade decreased sharply.

The extent to which foreign markets for American cotton were affected by these forces has been examined in preceding chapters. The prosperity of cotton-growers and middlemen engaged in handling this fiber has been disastrously affected because a very large part of their incomes depended upon foreign markets. Consequently, in considering the potential demand for cotton, the outlets in other lands cannot be neglected. That the foreign demand will depend largely upon the outcome of the war there is little doubt.

Winning the peace, a problem which may well be more difficult than obtaining an armed victory, implies at least two fundamental objectives. In the first place, there is the more or less permanent removal of the threat of armed aggression. In the second place, there is the creation of an economic environment wherein the production, distribution, and consumption of commodities may be maximized for all peoples. There may be some question as to whether the latter objective can best be achieved by an economic organization such as Russia typifies or by the *laissez faire* of the Western world. But the divergence between these systems has been, for many years, more apparent than real. The extremes of both organizations have been forsaken as the necessity for compromise arose. This process may be expected to continue in the years after the war. In view of the expanding economy

envisaged in winning the peace,¹ the new economic organization may be assumed to take the form of *laissez faire* capitalism modified by enlightened social control² in both national and international areas. In such a system it will be necessary to proceed

by removing trade barriers and enlarging markets; by stimulating and guiding investments where they can be productive; by reducing—through appropriate fiscal policy and social security programs—the inequalities in incomes, so that a higher and more stable demand for consumers' goods will be attained; by applying advanced techniques and skills to the development of undeveloped areas; by re-equipping our own industrial and transportation system; and by providing to those people in greatest need better housing, schooling and recreation.³

Some steps to achieve this long-run objective already have been taken. The Atlantic Charter promised free access to raw materials for all peoples. Inevitably this involves the relaxation of exchange control, protective tariffs, import quotas, and clearing agreements. It implies a free market in which products will be bought from the cheapest source. Industrialization has rapidly spread around the world during the last two decades. In Russia, China, India, the East Indies, Australia, and Central and South America great strides have been made. This trend is in harmony with winning the peace. Indeed, it must be furthered by a policy of well-considered capital loans. Progress has also been made in national attempts to raise

¹ For the contrary view, however, see Quincy Howe, "12 Things the War Will Do to America," *Harper's Magazine*, November, 1942), p. 574.

² The meaning of the phrase "social control" is confined to the objectives and methods of government interference in economic matters which are projected by John M. Clark in his *Social Control of Business* (New York: McGraw-Hill Book Co., Inc., 1939).

³ Henry A. Wallace, "Foundations of Peace," *Atlantic Monthly*, CLXIX, 41.

the consumption levels of low-income groups in many countries. The widespread efforts of our own New Deal are well known. In a more restricted way, England, Austria (before 1937), and such South American countries as Argentina, Brazil, Chile, and Uruguay have proceeded in tentative fashion.

The reconstruction period following the war will unquestionably require large-scale efforts to feed and clothe millions of people in devastated areas. Such a program may be needed for many years until factories and farms are re-equipped and made ready for production. Whether such aids will be given through loans, Lend-Lease, or organized on a basis comparable to the cotton and food-stamp plans it is difficult to say. The latter two methods hold real promise because they fit into the projected economic organization required for winning the peace. Both plans require free exchange, both encourage higher living standards, and both have precedents.

Should the economic development follow the above broad outline in the post-war era, the potential demand for American cotton will be tremendously enhanced. The gradual industrialization of other parts of the world not only will require more cotton for foreign mill consumption but will greatly improve the income of all peoples and enable them to consume, among other things, more cotton products. Such an increase in demand in free world markets will rapidly eliminate surplus cotton production in the United States and render the cotton policy of the federal government entirely unnecessary. Competition with other producing areas will undoubtedly grow less keen because the United States remains the most desirable area in the world for the growth of this fiber. And,

furthermore, the recent trend toward the production of longer staple will enhance the competitive position of American cotton in the world's markets. The concentration of production in the United States will be a great gain in a world which has abandoned a policy of self-sufficiency; specialization will cease to be dangerous.

The real competition which the domestic grower will have to face will come from other fibers such as jute, flax, and rayon. Of these, the latter will be extraordinarily important. In nations of relatively high national incomes per capita, rayon will continue to expand into many uses. The great potential cotton markets lie in those areas where income is low. Of these, Central and South America, Africa, and Asia are most important.

For the years 1920-39, inclusive, the average annual volume of raw-cotton exports from the United States was 6,713,000 bales. In spite of reconstruction after the first World War, high tariffs and clearing agreements, national and empire production and marketing controls, active encouragement of competitive synthetic and natural fibers, and wars and revolutions—despite these handicaps the export record is impressive. Should the great nations carry out their responsibilities of maintaining peace and developing higher living standards among the world's poor, the foreign outlets for American cotton will unquestionably be greatly enhanced. Consequently, to forecast an export market for 7,000,000 bales, approximating the annual average during the period between the two great wars, is definitely conservative.

II. POTENTIAL DOMESTIC DEMAND

A review of the statistical position of cotton yields two important facts:

(1) the domestic consumption per capita has changed very little in the twenty-year period 1920-39 and (2) the foreign market rapidly deteriorated during the 1930's. An industry survey made by the author indicated that the trend in cotton consumption has been downward in the cotton small-ware mills, knitting mills, carpet and rug mills, and in the silk mills; it has been upward in the cotton mills, lace mills, cordage and twine mills, and in the woolen mills. These gains and losses in the use of cotton approximately balance and leave the per capita consumption with little change, although the total consumption has risen somewhat. The reasons for these trends are traceable to fundamental competitive forces which will undoubtedly continue to operate unless an unforeseen change in the price structures of the competing fibers should favor cotton.

This somewhat dismal picture of the potential demand for cotton is relieved in a minor degree by the efforts of the federal government to expand the employment of cotton in new uses. The national authority first became interested in the subject during the agricultural crisis which followed the first World War.⁴ In 1923 the Bureau of Chemistry carried on experimental work on fireproofing and waterproofing cotton fabrics. About the same time the Bureau of Agricultural Economics published three reports covering the results of tests to improve cotton airplane fabric (1920), the use of cotton in floor and floor coverings (1921), and the utilization of Pima cotton (1923). In 1927 a formal program for studying cotton utilization and carrying on development work was projected by the Bureau of

Agricultural Economics, and in the following year the Congress, taking cognizance of the need, passed a bill entitled, "Act Relating to Investigations of New Uses for Cotton." This act authorized the secretaries of Agriculture and Commerce "to engage in technical and scientific research in American-grown cotton and its by-products, and to diffuse such information among the people of the United States."⁵ The Bureau of Agricultural Economics, on which most of the work imposed by this legislation fell, laid out a very broad program of research covering the existing uses of cotton, inquiry into specific new uses, and the release of formal publications.

Such an ambitious program should not lead the reader into optimistic anticipations of results. For it must be said that deplorably little has been accomplished actually to increase cotton consumption. But, as the research student knows, the results of the Bureau's activities in this regard should not be measured in terms of bales of cotton; it is much too soon to expect tangible results of any magnitude. When the Bureau turned to examine the existing uses for cotton, precious little information was available. Long and tedious research brought to light some new information which, though very valuable, went but little of the way in presenting the whole story. Many times the New Uses Section delved into the technical requirements for fibers in such uses as bagging, packaging, etc.; engaged in scientific tests of the performance of cotton in these outlets; and discovered the changes necessary in the yarns, weaves, and size of the cotton product before suitable specifications could be devised, only to encounter manufacturers who were frequently lukewarm to the introduction of cotton into

⁴ Letter from the U.S. Department of Agriculture, Southern Regional Research Laboratory, August 28, 1943.

⁵ Pub. No. 270 (70th Cong.).

new markets or to find consumers who were prejudiced against cotton-bagged groceries and cotton hosiery!

Up to 1938 the Bureau seemed to concentrate upon the bagging field in its efforts to find new cotton outlets. Reports on the existing and potential⁶ use of the textile for containing farm products, groceries, cotton, fertilizer, flour, and cement were made. In addition, reports were published during this period on the possible use of cotton for curing cement, bituminous-surfaced roads, gas-tight fabric for fumigating tobacco seed beds, linings for terraced ditches, farm uses, power laundry uses, combed marquisettes, and tire cord. By the end of 1939 the efforts of the federal government to broaden the consumption of cotton included (a) a new markets for cotton program, (b) a cotton mattress and comforter program, (c) a cotton-stamp plan, and (d) a cotton export program.

This expansion in the activities of the government has been made possible by the passage of Public Act No. 320 in August, 1935, which amended the first Agricultural Adjustment Act. Section 32 provided that 30 per cent of the annual customs receipts be made available for the purpose of increasing the demand for farm products by diverting them from their normal channels of trade.⁷ The ex-

⁶ The term "potential" as used in these reports refers to the volume of cotton which would be required to replace all competing fibers presently employed in each use. This definition ignores the competitive disadvantages which cotton suffers with respect to price, utility (appearance, convenience, wearability, sifting properties, handling), and traditional usage in the market. In other words, commercial feasibility is not a factor in determining this "potential." Thus the quantitative "potential" arrived at by the Bureau is purely academic except in a thoroughly regimented economy.

⁷ L. Myers, E. H. Omohundro, and N. B. Salant, "Diversion of Cotton and Cotton Products from Their Normal Channels of Trade" (Wash-

penditures made out of this fund for the benefit of cotton are shown in Table 27.

The experimental nature of the government's program is clearly evident in the confused classification of the outlets and in the lack of trend in the expenditures for many of the projects. The first seven classifications roughly reflect the activities of the New Uses Section of the Bureau of Agricultural Economics. Abrupt changes in the dollar expenditures made on the projects of both the Bureau and the Surplus Marketing Administration were the rule. Consistency is evident in the outlay for cotton bagging for raw-cotton bales and for variety improvement.

A. NEW MARKETS FOR COTTON PROGRAM⁸

During 1939 this program of the Bureau included experiments in the use of cotton for (1) insulation for houses and other structures; (2) covering raw-cotton bales; (3) ditches and canal linings; (4) stabilizing road cuts and fills; (5) roads, streets, and airport runways; (6) protecting tree seedlings; (7) protecting fruits and vegetables; (8) fumigating tobacco plants; and (9) peanut bags.

In administering this program, the usual procedure has been to supply cotton to firms, trade associations, government bodies, etc., which will co-operate with the Bureau in carrying on experiments in the use of cotton for those particular purposes. The great majority of the co-operators were federal, state, and municipal government departments and bureaus. The Bureau of Agricultural Economics specifies the weave and size of the cloth and the conditions under which the experiment must be carried

ington: U.S. Department of Agriculture, 1939). (Mimeographed.)

⁸ *Ibid.*

on. All the projects were begun on a small scale, the unpromising being discarded and the promising expanded. This policy accounts for the abrupt change noted above in the expenditures on the first seven classifications of projects. A prime requisite of each project is that it must yield results which not only are technically favorable to cotton usage but potentially must be commercially feasible. Manufacturers of the experimentally produced cotton products are subsidized out of section 32 funds. As the new use expands and an increasing market is found, the subsidy is gradually decreased and eventually discontinued altogether.⁹ All the above and other closely related projects were in the subsidy state at the close of 1939. Only the manufacture of cement curing mats was carried on without government aid.

One of the important features of the new uses program is that, in the projected outlets, cotton may have to compete with other textile fibers in terms of utility and price but not in style.¹⁰ There is no competing fabric in such uses as curing mats for cement,¹¹ ditch linings, and road, street, and airport runway reinforcements. In such outlets as these cotton must prove that the value of its employment exceeds its cost. In the remaining potential markets cotton competes with other fibers. The reports of the Department of Agriculture are particularly optimistic about the possibilities of cotton as an insulator.

⁹ From an address by J. B. Wyckoff, chief of the Marketing Division, Surplus Marketing Administration, at the Cotton Research Congress held in Waco, Texas, June 28, 1941.

¹⁰ The New Uses Section spent considerable time in developing specifications for women's cotton hosiery—a style good. The research has been discontinued in the face of the refusal of women to wear the product.

¹¹ Older methods of curing cement included ponding, wet earth, hay, straw, and some burlap.

B. COTTON MATTRESS AND COM- FORTER PROGRAM

In carrying out this project, the Surplus Marketing Administration supplies cotton and the ticking necessary in the manufacture of mattresses to picked families in the cotton-growing South whose income is less than \$50 per month. The recipients contribute their own labor in the manufacturing process. This is a particularly desirable outlet for surplus cotton, for it increases the real income of these family groups and tends to increase the sale of other cotton products such as bedspreads, pillow cases, and blankets. During 1939 the program provided an outlet for 100,000 bales of raw cotton, and it is estimated that, for a few years at least, 600,000 bales could be distributed in this way.¹² If the project were expanded to include all low-income families throughout the nation, a permanent outlet for a minimum of 500,000 bales per year probably could be attained.

To this program there is a drawback when it is considered from the point of view of a potential market for cotton. As conducted in 1939, this was a relief project made possible at a public cost of between six and seven million dollars. As an outlet for 500,000 bales, the annual cost would approximate \$32,500,000. Unless the purchasing power of these low-income groups can be raised, there is little likelihood that this potential market will become commercially feasible.

¹² Federal Surplus Commodities Corporation, *Can We Use Our Cotton at Home?* (Washington: Government Printing Office, June, 1940), pp. 6-7. The emphasis on the near-term possibilities reflects the fact that the product is semidurable. In the long run the volume required would depend upon the requirements of new families and for replacements.

C. COTTON-STAMP PLAN¹³

This method of reducing the volume of surplus cotton and increasing the real income of relief families was begun on an experimental basis in May, 1940, at Memphis, Tennessee, and within a month it was tried out in Springfield, Massachusetts, and St. Paul and Minneapolis, Minnesota. The project was operated on a basis similar to the food-stamp plan. Relief families certified by local agencies were encouraged to buy, in each three-month period, green-colored stamps in amounts varying between two and six dollars, depending upon family size, and to receive in addition brown-colored stamps equal in value to those purchased. Both types of stamps were then spendable at retail stores for manufactured cotton products. As indicated in Table 27, the cost of the brown stamps to the nation's taxpayers was \$120,000 in the first year and \$2,285,000 in the second. The latter expenditure was equivalent to moving 7,500 bales of raw cotton into this market.¹⁴ There is no question but that the market for cotton goods among the low-income groups of the nation is scarcely tapped. Table 28 shows that the expenditures for these products amounted to less than \$18 per year for families whose incomes were under \$500 but that the outlay for these goods rose rapidly to \$112 per year for the highest income class. It has been estimated that an extreme limit

¹³ *Ibid.*

¹⁴ Based upon an estimated \$600,000,000 as the cost of distributing 2,000,000 bales of cotton by this plan (*ibid.*, p. 6). To assume that it would cost \$300 per bale to distribute cotton is nothing short of ridiculous. Even at the high average price of 10 cents per pound the federal authority could acquire raw cotton from assemblers for approximately \$50 per bale. If it costs an additional \$250 per bale to get the product into the hands of worthy consumers, the federal government should get out of the relief business and call for bids from private enterprisers.

of 2,000,000 bales¹⁵ of cotton could be distributed annually by the stamp plan at a cost of \$600,000,000.

The benefits of the cotton-stamp plan accrue to many more people than those directly concerned. Not only would their real income rise sharply but the government would be freed from the task of making loans (the cost would be transferred to the stamp plan) on a considerable volume of cotton. There would be

¹⁵ As indicated by the following calculations, this figure is altogether too high.

Income Group	Number of Families*	Per Cent of All Families*	Per Cent of National Incomes*	Dollars per Family Spent on Cotton Goods†
Under \$500.....	4,178,284	14.21	3.01	\$17.00
\$ 500-\$1,000.....	8,076,263	27.47	23.30	27.37
1,000- 1,500.....	6,747,910	22.95	17.32	36.73
1,500- 2,000.....	4,240,395	14.42	15.19	44.38

* U.S. Bureau of the Census, *Statistical Abstract of the United States: 1940* (Washington: Government Printing Office, 1940), p. 316.

† From Table 28. All data refer to the year 1935-36; mill consumption of cotton in 1937 was 5,748,000 bales; and value of manufactured cotton goods (excluding fish nets and seines) in 1937 was \$1,271,000,000.

If the income of the families receiving less than \$500 per year were raised enough to put them into the \$500-\$1,000 group, their purchases of cotton goods would rise by \$40,000,000. This figure is 3.2 per cent of the value of manufactured cotton goods in 1937 and would require an increase in mill consumption in the year of 184,000 bales of raw cotton. Upon the same basis of consumption, increases in the purchasing power of the two lowest income groups sufficient to raise them into the \$1,000-\$1,500 class would improve their purchases of cotton goods by 12.1 per cent and cause mills to consume an additional 696,000 bales of raw cotton. Finally, if the three lowest income groups could be put into the \$1,500-\$2,000 class, the additional mill consumption of raw cotton would amount to 1,334,000 bales. Even though mill consumption, in this final case, were assumed to be 7,500,000 bales (the figure used for the estimate referred to in the text), the added mill take of raw cotton would only amount to 1,741,000 bales. Hence, after allowing for shortcomings in this method of estimation, and assuming the millennial change in the distribution of national income so that the \$1,500-\$2,000 group would be the lowest-income class, the increase in raw-cotton consumption would only approximate a maximum of 1,500,000 bales.

an increase in employment in factories and in wholesale and retail establishments, and the national income would rise.¹⁶ These advantages might conceivably outweigh the cost of the government subsidy.

In its contribution to relief projects, the federal government has opened up a field for new cotton markets which has hitherto remained unexplored. The Federal Surplus Commodities Corporation distributed cotton to families more as a relief measure than as an attempt to find new permanent markets. Still, it is quite clear that the nub of the whole question of the domestic demand for cotton was encountered in the problem of inadequate purchasing power of relatively low-income consumers. The unfortunate maldistribution of buying power serves to restrain a large volume of consumption of all products, including cotton, and tends to keep real income at a dishearteningly low level. It may not be an exaggeration to say that a much better distribution of income would be an important contribution to the solution of excess cotton production.

To facilitate the consumption of cotton goods by low-income groups, the government had recourse to the stamp plan and the mattress program. In effect, this was an attempt to reapportion purchasing power through taxation, on the one hand, and public grants, on the other. Pushed far enough, the projects would considerably increase the

domestic market for cotton. But what of the method?

It was noted in chapter v that there is a tendency for the administrators of New Deal agricultural legislation to think of government aids in this part of the national economy as permanent policy. This attitude has created great apprehension on the part of thoughtful students of the relation between government and economic activity. Is it necessary to resign one's self to the continuation of this method of redistributing purchasing power? Such resignation is hard to attain for those trained in the tradition of free enterprise. As a short-run program there is little to criticize, that is, as a relief project these methods got immediate and direct results. But, as a long-run program, hope should not be abandoned for an attempt to solve the problem of maldistribution of buying power by such other means as a thoroughgoing reform of the tax system (greater reliance upon ability to pay and the elimination of regressive taxes), removal of international trade barriers, the constructive organization of wage-earners, and, perhaps most important of all, the education of the human element in the national economy with a view toward increasing the mobility of the factors of production in their alternative uses. Such a program would restore in some degree the individual freedom of enterprise which we presently seem to have compromised.

It is not reasonable to claim that such a long-run policy would solve the cotton problem. Undoubtedly many assumptions are made which are practically impossible of realization. Unilateral action by the United States, while entirely beneficial to the national welfare, would be vigorously opposed by vested interests in the domestic market. There

¹⁶ No increase in the capacity of cotton mills would be involved. It was estimated in 1940 that if the mills were operated on a twenty-four shift, they could consume between nine and nine and one-half million bales (see Federal Surplus Commodities Corporation, *op. cit.*, p. 6). It should be pointed out that this was a "pre-war" estimate and, like so many others, grossly erred on the conservative side. The evidence before us today indicates that no expansion in capacity was necessary to manufacture nearly 13,000,000 bales.

is no guaranty that international trade will really be left without obstacles. Political and military objectives typically override economic welfare. And perhaps most fundamental of all is the assumption that the economic machinery, if left free from governmental interference, will continuously operate in the interests of the national welfare. The long history of the success of private interests in controlling production, fixing prices, limiting competition, and actually securing government aid in the furthering of these activities should certainly warn against a naïve faith in the beneficence of an automatic (self-directed) system of free enterprise. In fact, a very good case could be made for the proposition that government interference in business activity in the twentieth century is the natural and direct result of a greedy and unscrupulous capitalism during the nineteenth.

Despite the reservations which may be held with respect to the efficacy of the system of free enterprise, those who make policy should obviously guard against a resort to the opposite extreme. The problems involved in the administration of a thoroughgoing system of government control are staggering and, in the writer's opinion, wholly unsolvable. The best hope for the welfare of Americans in the relatively near future seems to lie in a middle course between the system of free enterprise and extensive government control.

D. COTTON EXPORT PROGRAM

As a further effort to reduce the large cotton carry-over, the federal government resorted to export subsidies in 1939. In the fiscal year 1940, raw-cotton exports were "facilitated" at a cost of nearly \$35,800,000; no raw-cotton exports were subsidized in the succeeding year. Cotton products were also exported un-

der this program at a cost of \$1,827,000 in the fiscal year 1940 and \$7,404,000 in 1941.

This program was resorted to in the hope of eliminating part of the large cotton surplus from the crops of 1937 and 1938. The plan was allowed to dwindle to relative unimportance because a great deal of resentment was created among competitors in other cotton-exporting regions. Even in the absence of this objection, the disruption of the international economy by World War II would have necessitated its discontinuance.

As a method of expanding the demand for domestic cotton, export subsidies have the least merit of all. The government merely realized a loss on its loan cotton and thus removed the possibility of recovery at a later date. The beneficiaries were foreign consumers and domestic growers. And, finally, there is no prospect of retaining a foreign market created in this way without continuing subsidies which inevitably lead to foreign retaliation.

On theoretical grounds there is a definite possibility for a monopolistic exporter to secure a gain from subsidies of this type. This is particularly true when the foreign elasticity of demand is greater than the domestic elasticity. In the case of foreign cotton markets it is to be expected that different markets have different elasticities. The possibility of the federal government's standing to gain from this practice is eliminated by the existence of competitive exporters in India, Egypt, and South America. The whole price structure in foreign consuming centers would fall. Any perceptible shift in the share of the market in favor of American exporters would not be permanent. It would last only so long as the surplus over normal carry-over remained.

There is every reason to believe that

this temporary resort to export subsidies represented a complete reversal of the attitude of the government toward the price structure in foreign markets. As has been pointed out above, the efforts of the Administration between 1933 and 1938 were directed toward avoiding a break in the world price of cotton, and, in order to secure this result, a program of crop loans and price maintenance was carried out. The resort to export subsidies reflected a great fear of the continuing cotton surpluses. The agricultural authorities accepted at long last a program which harked back to the Export Debenture Plan of the 1920's.

How far can one proceed, on the basis of the foregoing analysis, to suggest in quantitative terms the potential demand for domestic cotton? The difficulty of estimating the volume which may go into newly developed uses has been stressed. It is probable that such quantities will offset the loss of cotton markets to rayon.¹⁷ There is every reason to believe that the annual domestic mill consumption will at least equal 6,190,000 bales, the average annual volume for the period 1929-39, inclusive. The foreign market will probably absorb 7,000,000 bales annually. Even without the problematical new consumption by low-income groups (facilitated by relief programs), and without relying upon more intelligent domestic and foreign policies than existed between 1920 and 1939, cotton-growers may conservatively rely

upon an expected market varying between 13,000,000 and 14,000,000 bales of raw cotton each year.

A comparison of the potential consumption of cotton with the volume of cotton ginnings is revealing. For the nineteen-year period beginning August 1, 1920, the average annual quantity of ginned cotton was 13,192,000 bales; for the "regulated" five-year production period, beginning August 1, 1934, the comparable figure was 12,418,000 bales.

It must be concluded that the potential demand for American cotton should be viewed with mild optimism. It holds the prospect of eliminating the problem of cotton surpluses entirely provided there is no future stimulus to acreage expansion and the scourge of extraordinary cyclical depressions does not again return. With these, the ever-normal-grain plan cannot cope.

III. CONFLICT IN FEDERAL POLICY

Glaring inconsistencies in the handling of the cotton production and distribution program are obvious. As far as the producers are concerned, a price-raising policy has been followed. Acreage reduction, marketing quotas, and high loan prices (under which the government bears the losses and the borrowers take the gains) have all been integrated with the purpose of achieving parity prices and parity incomes. On the other hand, efforts to get rid of surplus cotton have included the subsidization of research in new uses and of exports, and grants of owned cotton to relief agencies. The price-raising policies have been much more successful than the surplus reduction program. Prices were lifted considerably above the 1932 levels, but the Commodity Credit Corporation reported on December 31, 1939, that it owned

¹⁷ It has been proposed that an additional outlet for short-staple cotton may be found in its utilization as raw material in rayon manufacturing. Chemically this would be feasible; in fact, the acetate method of manufacturing rayon employs linters as raw material. The difficulty with the program is that the price of cotton cellulose exceeds the price of wood fiber. Until this situation is reversed, there is little likelihood that short-staple cotton will generally be used as a raw material in the production of rayon.

6,867,207 bales and was holding 3,825-385 bales as collateral against loans.¹⁸

The high domestic price policy was the chief factor in reducing exports from 7,156,600 bales—the annual average for the period 1920-29, inclusive—to the all-time low of 3,325,000 bales for the 1938-39 season.¹⁹ In the domestic market the price policy failed to reduce per capita consumption, largely because the national income was rising and because the demand curve for cotton is inelastic. Nevertheless, there is some question of the advisability of maintaining artificially high prices in the face of efforts to find new outlets among the low-income groups. It is conceivable that their demand for cotton products may be quite elastic at low prices.

The federal government is in the position where it must make a choice between these conflicting policies. The price enhancement program is essentially a farm relief policy which, if continued after the war, will never eliminate cotton surpluses by commercial processes. On the other hand, if the cotton problem is conceived in terms of recapturing old markets and discovering new ones, the

large foreign demand and the potential outlet among the relatively low-income groups within the nation can be reached commercially only by allowing cotton prices to drop to levels which are internationally competitive. In practical terms, "surplus" acreage and production must be reduced gradually through the process of educating growers to the alternative uses of their productive factors; and, further, a considerably greater equality in the distribution of the national income must become a reality.

The federal authorities must make their programs consistent with each other and with the much larger domestic and foreign policies of the nation. The conception of long-range policies requires the highest order of knowledge and intelligence; carrying them out demands vision, courage to modify the degree of government control of economic activity as circumstances demand, and great administrative ability. As yet the backward state of our political development has rendered impossible a national conception of either the proper policies to follow or the administrative measures necessary to realize the objectives. We have reached a point in our history where free men must accept the challenge and succeed in achieving these pressing national objectives, or they will not long remain free.

¹⁸ *Statement of Loans and Commodities Owned, Commodity Credit Corporation, December 31, 1939.*

¹⁹ U.S. Department of Agriculture, *Agricultural Statistics: 1940* (Washington: Government Printing Office, 1940), p. 114.

CHAPTER VII

NOTE ON THE TECHNOLOGY OF RAYON MANUFACTURE¹

ALTHOUGH rayon was invented by Count Hilaire Chardonnet in 1884, it was not produced in commercial quantities in the United States until 1911. Until 1924 the commodity was variously known as artificial silk, art silk, and fiber silk. In that year the National Retail Dry Goods Association adopted "rayon" as the generic term of synthetic fibers. The Bureau of Standards defines rayon as "the generic name of filaments made from various solutions of modified cellulose by pressing or drawing the cellulose solution through an orifice and solidifying it in the form of a filament or filaments by means of some precipitating medium."

From the marketing point of view, manufacturers of the new fiber were greatly aided by the general acceptance of the term "rayon." They were enabled to sell it on its own merits as a distinctly new fiber instead of having it treated as a substitute for, and psychologically inferior to, silk. Accompanying this clarification of the qualities of rayon, producers took the further step of product differentiation and adhere to such trade-names as Tubize, Celanese, Bemberg, etc.

Three processes are now used in the

¹ Source material dealing with the technology of rayon production is readily available. Information for this note was taken from U.S. Department of Agriculture, *Report on Development and Use of Rayon and Other Synthetic Fibers* (Washington: Government Printing Office, 1938); *The Story of Rayon* (3d ed.; New York: American Viscose Co., 1937); and Eugene W. K. Schwarz and Herbert R. Manersberger, *Rayon and Synthetic Yarn Handbook* (New York: Rayon Publishing Co., 1936).

manufacture of rayon.² For more than a decade the *viscose* method has been used to produce over 85 per cent of the world rayon output. While small amounts of cellulose have been obtained from cotton linters, wood pulp is the chief source of raw material. The pulp sheets are steeped in a strong caustic soda solution and then subjected to hydraulic pressure in order to remove excess alkali. The cellulose is next ground into crumbs, allowed to age, and is then mixed with carbon bisulphide. Excesses of this chemical are removed by air currents, and the resultant cellulose xanthate is dissolved in a weak solution of caustic soda. This produces a heavy viscous mass from which the process is named. After further aging, air bubbles are removed, and the viscous solution is ready for spinning. This is accomplished by forcing the cellulose through a spinnerette, a platinum nozzle with many perforations too small to be seen without the aid of strong light. From each perforation emerges a filament of rayon which is solidified by being pressed through a bath of coagulating acid. The yarn consists of as many filaments as there are holes in the spinnerette. After certain purification processes the yarn is wound on tubes, cones, or in skeins and is ready for sale.

By the *acetate* method about 10 per

² Originally there were four methods, but in 1934 the nitrocellulose or Chardonnet process was abandoned in the United States. In 1938 this method was used in foreign countries to produce 3,000,000 pounds, or 0.3 per cent of the world rayon production. (see *What Is Rayon?* [New York: American Viscose Co., 1938], p. 3.)

cent of the world output of rayon is manufactured; in the United States, however, the volume produced in this way was 24 per cent of the total domestic output in 1937. Purified cotton linters are treated with acetic anhydride, glacial acetic acid, and a catalyst to form cellulose triacetate. This material is hydrolyzed to obtain diacetate of cellulose, which is then precipitated in water. A great deal of water is absorbed at this stage, and the resultant mass is called an acetate ester of cellulose. When dissolved in acetone, the material is ready for spinning. Passing through a current of warm air, the filaments are solidified because the acetone is given an opportunity to evaporate. The filaments are combined to form a yarn which can be packaged for sale in any form desired.

Rayon manufactured by the *cuprammonium* process accounts for only 4 per cent of the world output. In the United States only the American Bemberg Company uses this method. Copper hydrate and ammonia are used to dissolve prepared cotton linters into a solution which is then filtered and thinned for spinning. The filaments are stretched by passing through a stream of deaerated water flowing at an increasing velocity. After leaving the water funnel, the yarn is treated in an acid-setting bath. Then it is wound and prepared for sale.

The product resulting from the foregoing manufacturing processes is known as continuous filament rayon. Until about 1923 this textile was used in the knit goods industry, chiefly the hosiery branch. Between 1923 and 1930 shipments were about equally divided between the knit goods and the woven goods industries. In the former field the uses of rayon were expanded to include underwear, dresses, sweaters, ties, etc. In the woven field most of the yarn was

used in the production of broad goods or cloth products varying in width from twelve to eighteen inches. After 1930 the increased output of yarn was absorbed chiefly in the manufacture of broad goods. The possibility of further extending the use of rayon yarn in this field appears to be limited, since the rate of increase in production has decidedly decreased.

Rayon staple consists of continuous filament yarn which has been cut into lengths varying from one to eight inches. Interest in staple is of recent origin. The lack of adequate raw textile fibres in Europe and Asia tempted manufacturers to experiment with staple as a substitute for natural fibers. Producers were agreeably surprised to find that spun rayon yarns of remarkable flexibility could be produced from staple. They can be spun on any standard textile machinery. The success which attended these experiments attracted wide attention and has been followed by a most extraordinary expansion in staple production between 1935 and 1939. The chief uses of spun rayon are in the woven goods field, where it competes with worsted, linens, and suitings made of other textiles.

The success with which manufacturers have broken down the early buyer resistance has been due almost entirely to the removal of obvious shortcomings of rayon as a textile and to the education of consumers in methods of handling rayon fabrics. In the 1920's the consumers who experimented with rayon products were adversely critical of them. Buyers were not aware of the care necessary in laundering and cleaning the fabric; they objected to the hardness and sheen of rayon; they demanded sheer hosiery which could not be manufactured from rayon.

In the decade of the 1930's, remarkable technological success attended the

persistent experiments of the manufacturers. They have increased the tensile strength of yarn and thus increased the ease of laundering fabrics. They produced rayon soft in texture and dull in sheen. This has been achieved by varying the type of cellulose and the manufacturing procedure. Through processes which twist and kink both yarn and spun rayon, excellent imitations of cotton, wool, and linen yarns can be made. Rayon has also become famous for the

dyes it will take. Remarkable color contrasts can be achieved by using yarns made from different processes because each takes a different dye.

The net effect of these developments has been the manufacture of a new family of synthetic fibers. Rayon is a unique textile. It is sold on its own merits which, together with the low price of the yarn, enable it to compete effectively in certain uses with cotton, linen, silk, and wool.

APPENDIX

TABLE 1

FACTORS AFFECTING THE UNITED STATES PRICE OF COTTON^a
 Summarized by Two Equations
 for the Periods 1920-1932 and 1920-1938
 (Figures in parentheses are Standard Errors)

Item	Results Obtained By ^b	
	Schultz	This Study
Period	1920-32	1920-38
$x_1^1 = \log X_1$ (deflated U. S. farm price)		
Constant term (in logarithms)	8.1689	7.4939
$x_2^1 = \log X_2$ (domestic supply)	-1.3945 (0.1958)	-1.6418 (0.2783)
$x_3^1 = \log X_3$ (foreign supply)	-0.7374 (0.4630)	-0.0662 (0.4635)
$x_4^1 = \log X_4$ (index of world business conditions)	0.9486 (0.2355)	0.3985 (0.3230)
R = coefficient of multiple correlation	0.9536 (adjusted)	0.9242
Percentage of variance of price attributable to:		
x_2^1	71.42%	79.49%
x_3^1	8.77%	0.12%
x_4^1	13.00%	6.19%

^bSchultz' equation: $X_1 = 1475(10^5) x_2^{-1.3945} x_3^{-0.7374} x_4^{0.9486}$

Equation of the present study:

$X_1 = 3118(10^4) x_2^{-1.6418} x_3^{-0.0662} x_4^{0.3985}$

^aSource: For the material on Schultz' work see his Theory and Measurement of Demand, pp. 316-320. Sources and methods used in deriving the equation reached in this study were the same as those used by Professor Schultz.

TABLE 2

ESTIMATED CONSUMPTION OF COTTON FOR CLOTHING, HOUSEHOLD, AND INDUSTRIAL USES FOR VARIOUS YEARS, 1919-1935^a

Year	Quantity Consumed			Total (Million pounds)	Per Cent of Total			
	Clothing (Million pounds)	Household (Million pounds)	Industrial (Million pounds)		Clothing (Per Cent)	Household (Per Cent)	Industrial (Per Cent)	Total (Per Cent)
1919	1,228	563	1,081	2,872	42	20	38	100
1921 ^b	1,158	566	970	2,694	43	21	36	100
1923 ^b	1,362	681	1,200	3,243	42	21	37	100
1925	1,335	692	1,246	3,273	41	21	38	100
1927	1,476	835	1,426	3,737	40	22	38	100
1929	1,384	803	1,421	3,608	38	22	40	100
1931	1,443	645	977	2,765	42	23	35	100
1933 ^b	1,308	700	1,034	3,042	43	23	34	100
1935	1,161	728	1,013	2,902	40	25	35	100
1937	1,244	717	1,255	3,216	38	22	39	99
1939	1,306	864	1,280	3,450	38	25	37	100

^aSource: U. S. Bureau of Agricultural Economics. These estimates for 1919 to 1935 inclusive are based on consumption of cotton in domestic textile industries reported in Census of Manufactures. Data for the years 1937 and 1939 were calculated by the writer from estimates of M. K. Horne, Jr. and F. A. McCord, Cotton Counts Its Customers (Memphis: National Cotton Council of America, 1942).

^bConsumption figures for these years are estimates based upon the total consumption of cotton in all industries.

TABLE 3

ULTIMATE CONSUMPTION^a OF COTTON IN DOMESTIC TEXTILE INDUSTRIES CLASSIFIED ACCORDING
TO ULTIMATE USES FOR VARIOUS YEARS, 1919-1935
(In 1,000,000 pounds)^b

Product	1919	1925	1927	1929	1931	1935
Industrial Uses						
Cotton narrow fabric (50%)	13	31	22	25	17	17
Cotton woven and other goods ^c	887	951	1,068	1,077	740	808
Cordage and twine	46	85	102	113	70	74
Thread (25%) ^d	7	8	7	6	5	9
Waste, unclassified (50%)	94	129	173	147	114	182
Yarn, unclassified (33 1/3%)	34	42	54	53	31	23
Total, Industrial Uses	1,081	1,246	1,426	1,421	977	1,113
Household Furnishings						
Cotton woven and other goods ^c	330	376	426	395	347	367
Wool--carpets and rugs	21	36	33	37	23	26
Wool blankets	8	9	12	16	10	11
Battings, wadding, and mattress felts ^f	69	91	130	149	114	211
Thread (25%) ^d	7	8	7	6	5	9
Waste, unclassified (50%)	94	129	173	147	114	182
Yarn, unclassified (33 1/3%)	34	43	54	53	31	23
Total, Household Furnishings	563	692	835	803	644	829

TABLE 3 - Continued

Product	1919	1925	1927	1929	1931	1935
Clothing Purposes						
Cotton narrow fabric (50%)	14	31	21	25	18	17
Cotton woven and other goods	808	891	1,047	972	847	829
Knit goods	302	290	277	258	191	196
Silk and rayon goods	18	15	17	13	12	31
Wool suitings	38	45	42	47	31	47
Felt goods	1	2	2	3	4	2
Thread (50%) ^d	12	18	16	13	10	17
Yarn, unclassified (33 1/3%)	35	43	54	53	31	22
Total, Clothing Purposes	1,228	1,335	1,476	1,384	1,144	1,161
Total, All Uses	2,872	3,273	3,737	3,608	2,765	2,902

^aConsumption is taken as the net disappearance of cotton in that use. This was obtained by subtracting the total quantity of yarn, waste, and secondary products produced for sale from the total quantity of cotton lint, linters, yarn, and waste purchased. Owing to lack of data, consumption was estimated from the quantity of finished product in some cases. The percentage figures refer to the proportion estimated to have been used in each outlet.

^bSource: Bureau of Agricultural Economics.

^cConsumption in the cotton goods industry was divided each year between clothing, household and industrial uses according to the estimated percentage going into each group.

^dTotal consumption in 1935; consumption for the manufacture of thread in the cotton goods industry in prior years.

^eCotton used in blankets and suitings was estimated as being proportionate to the relative quantity of part-cotton blankets and part-cotton suitings produced each year in the wool manufacturing industries.

^fConsumption for manufacture of batting, wadding, and mattress fillings in the cotton goods industry only prior to 1935; total for 1935. Quantities of waste, unclassified in 1935, have been reduced 100,000,000 pounds to allow for a like amount estimated to have been used in battings, waddings and mattress fillings.

^gIncludes 75,676,355 pounds of tire cord.

TABLE 4

PRODUCTION OF SELECTED COTTON WOVEN GOODS (OVER TWELVE INCHES
IN WIDTH) FOR VARIOUS YEARS, 1919-1939
(In 1,000,000 pounds of Manufactured Product)*

Product	Years									
	1919	1921	1923	1925	1927	1931	1933	1935	1937	1939
Total Production ...	1,815	1,742	2,205	2,071	2,434	1,851	2,075	1,881	2,541	2,479
Print Cloth	168	203	259	196	271	284	353	397	548	495
Narrow Sheetings ...	330	381	411	369	436	322	447	374	471	482
Osnaburg .....	.....	45	50	54	72	47	49	57	68	90
Colored Cloth .....	.....	.....	.....	.....	.....	.....	.....	256	306	271
Denims	87	90	124	104	145	110	130	107	133	116
Ginghams	77	112	118	72	60	11	15	8	2	5
Wide Fabrics (over 40 inches) .....	.....	.....	.....	.....	.....	.....	.....	160	253	269
Drills	118	71	105	103	129	72	58	7	11	8
Tire Fabric	30	96	164	189	197	137	118	118	168	163
Duck	289	153	64	32	30	14	117	119	166	142
Towels and Towelling	38	53	59	61	84	72	68	80	94	114
Table Damask	11	15	15	15	11	7	5	5	5	5
Bedspreads	13	17	20	21	24	16	.....	17	19	22
Other	645	507	816	855	975	759	715	176	297	297

*Source: U. S. Bureau of the Census, Biennial Census of Manufactures: 1923, 1927, 1931, 1932, 1937, 1939 (Washington: Government Printing Office, 1926, 1930, 1935, 1936, 1939, 1942).

TABLE 5

CONSUMPTION OF RAW COTTON IN THE PRODUCTION OF
CONSUMER GOODS FOR THE YEARS 1937 AND 1939*

Outlet	Volume of Consumption (In 1,000 bales of 478 pounds net weight)	
	1937	1939
Apparel Uses	2,602	2,731
Men's, Youths' and Boys' Apparel	1,508	1,626
Shirts	389	464
Trousers	222	285
Underwear	247	210
Overalls and coveralls	240	232
Hosiery	88	98
Pajamas and nightshirts	67	75
Gloves	73	62
Suits	42	44
Washable service apparel	31	32
Sweaters	24	31
Coats and jackets	25	28
Handkerchiefs	16	16
Hats and caps	14	14
Bathrobes	10	14
Rainwear	13	12
Women's, Misses' and Juniors' Apparel	490	598
Dresses	161	175
Underwear	81	104
Pajamas and nightgowns	39	58
Uniforms	41	51
Hosiery	39	46
Sportswear	18	31
Sanitary napkins	27	29
Handkerchiefs	16	17
Sweaters and jerseys	12	15

TABLE 5 - Continued

Outlet	Volume of Consumption (In 1,000 bales of 478 pounds net weight)	
	1937	1939
Children's and Infants' Apparel	101	120
Dresses	29	37
Playsuits	23	27
Overalls	15	23
Diapers	17	14
Hosiery	12	12
Retail Fabrics and Threads	503	387
Piece goods	455	332
Thread	32	40
Laces	14	14
Household Uses	1,499	1,808
Sheets	366	433
Towels and towelling	240	303
Blankets and blanketing	213	180
Draperies and upholstery fabrics ...	90	154
Rugs and carpets	125	148
Curtains	117	130
Bedspreads and bed sets	39	94
Pillow cases	64	75
Bed ticking	60	73
Oilcloth	48	63
Window shades	29	29
Embroidered scarfs and stamped art work	17	20
Hammocks, chairs and swings	18	18
Table linens	15	16
Mattress covers	11	13
Tapestries	10	13
Comforts and quilts	13	11
Mops and dusters	9	12
Cloths (dust and washing)	8	12

*Source: M. K. Horne and F. A. McCord, Cotton Counts Its Customers (Memphis: National Cotton Council of America, 1942).

TABLE 6

MEN'S HOSIERY PRODUCTION, CLASSIFIED BY FIBER
IN PER CENT OF TOTAL OUTPUT FOR
VARIOUS YEARS, 1927-1939*

Fiber	Per Cent of Total Production						
	1927	1929	1931	1933	1935	1937	1939
Cotton	49	37	29	33	29	34	39
Rayon	13	18	31	28	32	30	49
Silk	4	5	4	5	4	4	3
Wool	1	1	1	1	2	..	1
Mixtures:							
Cotton and rayon	13	22	21	19	18	19	..
Cotton and wool	8	7	3	7	8	9	..
Cotton and silk	1	..	..	..	1	1	..
Rayon and silk	6	4	3	3	4	3	..
Rayon and wool	1	1	1	1	..	..	..
Others	4	5	7	3	2	..	8
Total production (1,000,000 dozen pair)	43.7	44.6	40.3	38.1	42.9	39.0	36.3

*U.S. Bureau of the Census, Biennial Census of Manufactures: 1929, 1931, 1933, 1937, 1939 (Washington: Government Printing Office, 1933, 1935, 1936, 1939, 1942).

TABLE 7

MEN'S HOSIERY MILL PRICE IN DOLLARS
PER DOZEN PAIR 1919-1939*

Year	Cotton (188 Needles, Combed Yarn, Black)	Rayon (Cotton Top, Heel, Toe)
1919	\$2.106	\$7.625
1921	1.654	6.500
1923	1.778	6.500
1925	1.750	5.247
1927	1.592	4.250
1929	1.200	.....
1931	1.163	.....
1933	0.765 (carded)	.....
1935	1.000 (carded)	.....
1937	0.856	.....
1939	0.810 (176 needle)	.....

*Source: U.S. Bureau of Labor Statistics, Wholesale Prices, 1919-1939 (Washington: Government Printing Office, 1919-40).

TABLE 8

PRODUCTION OF WOMEN'S HOSIERY BY TYPE OF FIBER FOR THE CENSUS YEARS, 1919-1939*

Year	Cotton		Rayon		Silk		Wool		Cotton and Rayon		Rayon and Silk		Other Mixtures		Total Pairs (Million Dozen)
	Pairs (Million Dozen)	Per Cent	Pairs (Million Dozen)	Per Cent	Pairs (Million Dozen)	Per Cent	Pairs (Million Dozen)	Per Cent	Pairs (Million Dozen)	Per Cent	Pairs (Million Dozen)	Per Cent	Pairs (Million Dozen)	Per Cent	
1919 ..	36.8	71.6	0.8	1.4	1.8	3.6	0.4	0.8	...	...	...	...	11.6	22.6	51.4
1921 ..	30.2	58.0	1.6	3.1	2.6	5.0	1.1	2.2	...	...	...	...	16.5	31.7	52.0
1923 ..	34.7	58.2	2.2	3.6	3.1	5.3	0.6	1.0	...	...	...	...	19.0	31.9	59.6
1925 ..	28.6	48.0	6.9	11.6	16.3	27.4	0.3	0.5	0.5	0.8	2.4	4.1	4.6	7.6	59.6
1927 ..	10.8	24.5	5.0	11.3	20.6	46.7	0.1	0.1	1.1	2.4	3.6	8.0	3.1	7.0	44.3
1929 ..	7.3	14.2	7.1	14.0	28.3	55.3	...	...	2.2	4.3	2.4	4.6	3.9	7.6	51.2
1931 ..	4.3	....	7.1	....	27.8	....	...	...	...	...	0.8	...	2.6	...	42.6
1933 ..	5.9	13.0	4.6	10.0	30.9	67.7	...	...	1.4	3.0	...	...	2.9	6.3	45.7
1935 ..	4.3	8.5	3.9	8.0	39.2	78.6	...	...	0.8	1.5	...	...	1.7	3.4	49.9
1937 ..	3.0	5.8	2.7	5.2	44.8	85.9	...	...	...	...	...	...	1.7	3.3	52.2
1939 ..	5.6	8.8	3.9	6.1	53.4	83.9	...	...	...	...	0.2	0.3	0.5	0.8	63.6

*Source: U. S. Bureau of the Census, Biennial Census of Manufactures: 1923, 1927, 1929, 1931, 1933, 1937, 1939 (Washington: Government Printing Office, 1926, 1930, 1933, 1935, 1936, 1939, 1942).

TABLE 9

CHIEF INDUSTRIAL OUTLETS FOR COTTON, 1937 AND 1939*

Outlet	Volume of Consumption (in 1,000 bales of 478 pounds net weight)	
	1937	1939
Automobile tires	634	633
Bags	477	459
Cordage, industrial thread, and twine	325	357
Mixtures (with rayon, silk, wool, hair)	116	131
Shoes (chiefly linings and laces)	105	109
Awnings	99	77
Automobile uses other than tires (chiefly upholstery, linings, and slip covers)	89	74
Medical supplies (chiefly absorbent cotton, bandages, and gauze)	85	88
Artificial leather	72	81
Duck hose and belting	75	61
Tents	53	41
Tarpaulins	42	32
Laundry equipment and supplies (chiefly nets, ironing board covers, felts) ..	39	39
Military uses	35	38
Harness	38	38
Sporting equipment and supplies	30	30
Tapes and bindings (woven)	23	26
Mattress stuffing (lint cotton)	25	25
Aviation supplies and equipment	25	25
Bookbindings	25	23
Meat stockingettes (knitted)	19	22
Luggage	16	19
Fish nets, netting and seines	18	19
Caskets	16	17
Insulation	15	16
Tobacco cheesecloth	12	13
Stage screens, wings, backdrops	13	13
Signs, advertising caps, aprons, novelties	13	13
Rubberized fabrics	10	13
Filter cloths	9	10
Cotton bale covering	1	10
All others	73	68
Total	2,626	2,677

*Source: M. K. Horne and F. A. McCord, Cotton Counts Its Customers (Memphis: National Cotton Council of America, 1942).

TABLE 10

PRICE OF BURLAP, OSNABURG, AND COTTON YARN
TOGETHER WITH THE INDICES OF THEIR PRICES
FOR VARIOUS YEARS, 1927-1937

Year	Burlap ^a		Osnaburg ^b		Cotton Yarn ^c	
	Price	Index ^d	Price	Index	Price	Index
1927 ...	9.76	221	....	...	30.6	200
1928 ...	10.04	228	....	...	32.6	234
1929 ...	8.52	193	....	...	32.2	231
1930 ...	6.10	139	....	...	24.2	174
1931 ...	4.21	95	....	...	17.6	127
1932 ...	4.41	100	5.0	100	13.9	100
1933 ...	5.55	126	7.9	158	22.0	160
1934 ...	6.17	140	10.3	206	28.2	203
1935 ...	5.96	135	10.6	212	27.4	197
1936 ...	5.39	122	9.4	188	24.8	179
1937 ...	5.40	122	9.4	188	26.5	191
1938 ...	4.93	112	6.5	130	19.2	138
1939 ...	6.91	157	7.3	146	21.0	151

^aStandard Trade and Securities (New York: Standard Statistics Co., Inc.), Vol. III. Average of one price weekly, New York, 10 1/2 ounce, 40 inches, cents per yard.

^bU.S. Bureau of Labor Statistics, Wholesale Prices: 1927-37 (Washington: Government Printing Office, 1927-1938). Seven ounces, 30 inches wide, mill price in cents per yard.

^cIbid. 10/1, Northern, mill price in cents per pound.

^dAll index numbers were calculated by the writer.
1932 = 100.

TABLE 11

PERCENTAGE OF WORLD RAW-COTTON EXPORTS CONTRIBUTED
BY PRIMARY SOURCES FOR SELECTED PERIODS
1925-1939*

	1925-29	1930-34	1939
United States	62.6	61.1	40.7
India	21.5	19.9	21.9
Egypt (including Uganda and Sudan) .	12.3	14.6	20.8
Peru	1.6	2.0	3.0
Brazil	0.8	1.4	12.6
Mexico	0.7	0.2	0.3
Argentina	0.6	1.0	0.7

*Source: U.S. Department of Agriculture, Agricultural Statistics: 1940 (Washington: Government Printing Office, 1940), p. 130. Percentages were calculated by the writer.

TABLE 12

PER CENT OF AMERICAN RAW-COTTON EXPORT SALES MADE IN SELECTED NATIONS, 1920-1939*

Year	Total Exports (1,000 Metric Tons)	Per Cent of Total																
		Europe	South and Central America	Asia	United Kingdom	Ger- many	France	Italy	Spain	Bel- gium	Nether- lands	Sweden	Poland	Russia	Canada	Japan	China	India
1920	1,431	85	0.7	11	41.2	11.8	10.6	8.9	4.6	3.1	1.4	1.4	...	...	3.3	10.6	...	...
1921	1,494	77	0.4	20	25.7	22.9	10.1	8.5	4.2	2.9	1.3	1.3	...	...	2.5	17.0	2.4	...
1922	1,430	86	...	10	29.9	20.5	13.8	9.3	5.6	3.2	1.5	1.0	...	...	3.0	9.5	...	...
1923	1,244	83	...	13	29.7	19.1	12.6	10.2	3.4	3.1	1.5	1.3	...	...	3.6	12.8	...	...
1924	1,580	87	...	10	29.0	24.0	11.9	8.7	3.6	2.5	1.8	1.0	...	...	2.4	9.9	...	...
1925	1,989	85	...	12	28.5	23.8	11.0	8.6	3.6	2.4	1.8	...	...	...	2.6	11.6	...	...
1926	2,128	81	0.1	16	25.4	23.0	11.4	9.1	3.5	2.6	1.4	...	...	...	2.9	13.6	...	...
1927	2,221	77	...	20	17.7	27.6	10.2	7.1	3.4	2.8	1.5	...	...	...	2.7	15.0	...	2.6
1928	2,028	80	...	17	23.1	23.9	9.7	9.6	3.8	2.4	1.9	...	...	...	3.1	14.3	2.0	...
1929	1,762	79	0.1	18	20.5	22.4	11.1	10.4	3.9	2.6	2.1	...	...	...	3.1	14.6	3.1	...
1930	1,552	78	0.1	19	18.3	25.4	14.3	8.2	3.9	2.2	1.9	...	...	...	2.9	13.7	4.9	...
1931	1,634	58	0.1	40	13.0	19.9	6.5	7.9	3.6	2.3	1.6	...	...	...	2.0	25.4	12.6	2.0
1932	2,139	64	0.1	34	16.5	19.6	9.2	7.9	3.7	1.8	1.6	...	...	...	2.0	22.0	6.5	2.1
1933	2,001	71	0.6	26	17.7	19.8	10.3	8.6	3.7	1.8	1.5	...	...	...	2.5	21.5	3.7	...
1934	1,374	59	0.3	35	15.4	12.9	7.5	7.7	4.4	1.6	1.4	...	...	...	4.1	25.7	4.9	...
1935	1,399	67	0.4	28	20.0	10.1	10.2	6.3	1.8	2.8	1.2	1.5	...	...	4.1	24.9	...	...
1936	1,282	69	0.5	26	22.5	12.8	13.4	9.2	...	2.6	2.1	1.6	...	...	4.9	24.9	...	...
1937	1,377	77	0.6	18	26.3	14.1	12.8	8.8	...	3.2	2.1	1.7	...	...	4.9	15.2	...	...
1938	1,038	66	1.2	26	18.7	7.5	10.5	9.2	...	3.0	1.9	2.0	...	...	5.5	23.4	1.0	1.2
1939	1,091	67	1.5	24	24.3	3.8	8.3	8.1	4.1	3.5	3.0	4.5	2.0	...	6.2	17.8	6.0	...

*Source: Calculated by the writer from data appearing in U.S. Bureau of Foreign and Domestic Commerce, Foreign Commerce and Navigation of the United States: 1920-1939 (Washington: Government Printing Office, 1921-40).

TABLE 13

SWEDEN: PRODUCTION AND IMPORTS OF TEXTILE FIBERS
FOR THE PERIOD 1920-1939*

Year	Production (1,000 Metric Tons)		Imports			Yarn		
	Wool	Rayon Filament	Flax	Cotton		Wool (1,000 Metric Tons)	Flax Hemp (1,000 Metric Tons)	Cotton (1,000 Metric Tons)
				Total (Raw and Waste in 1,000 Metric Tons)	From U.S. (Raw, in 1,000 Metric Tons)			
1920	....	....	.	....	20	..	..	.
1921	....	....	.	....	11	..	..	.
1922	....	....	4	18.0	14	.8	..	1
1923	1.2	0.03	.	19.0	16	8	..	2
1924	1.6	0.06	.	21.0	16	8	..	2
1925	1.0	0.10	.	20.0	13	6	..	2
1926	1.0	0.10	2	23.0	13	7	13	2
1927	0.9	0.10	2	28.0	14	8	16	2
1928	0.9	0.20	1	29.0	13	8	17	2
1929	0.9	0.20	1	27.0	13	8	15	2
1930	0.9	0.20	1	29.0	11	8	16	2
1931	1.0	0.30	1	29.0	11	8	11	2
1932	0.7	0.30	1	30.0	16	9	14	2
1933	0.7	0.30	1	28.0	17	9	14	2
1934	0.7	0.50	1	39.0	21	11	17	4
1935	0.7	0.60	1	35.0	20	10	19	.
1936	0.7	0.70	.	....	21	..	..	.
1937	0.7	0.80	1	....	23	..	..	.
1938	0.7	0.80	.	....	20	..	..	.
1939	0.7	0.90	.	....	49	..	..	.

*Source: For production data, Statistical Yearbook of the League of Nations: 1920-1939 (Geneva: League of Nations, 1921-39); For imports, except from the United States, International Trade Statistics: 1920-1939 (Geneva: League of Nations, 1928, 1931-40); for American imports, Bureau of Foreign and Domestic Commerce, Foreign Commerce and Navigation of the United States: 1920-1939 (Washington: Government Printing Office, 1921-40).

TABLE 14

CANADA: PRODUCTION AND IMPORTS OF TEXTILE FIBERS
FOR THE PERIOD 1920-1939*

Year	Production (1,000 metric tons)			Imports		
	Flax	Wool	Rayon Filament	Cotton		
				Total (1,000 metric tons)	From U. S. (1,000 metric tons)	Percentage from U. S.
1920	..	..	...	..	46	...
1921	..	..	...	..	37	...
1922	11	8	...	57	47	83
1923	..	7	...	43	45	100
1924	..	7	...	46	38	83
1925	8	7	0.2	58	52	90
1926	19	8	0.9	61	61	100
1927	39	9	1.1	61	61	100
1928	62	9	1.6	63	55	87
1929	41	9	1.7	53	55	100
1930	55	10	1.8	44	45	100
1931	..	9	2.7	42	39	93
1932	..	9	3.3	44	43	98
1933	..	9	3.3	53	50	94
1934	..	9	4.8	65	59	91
1935	..	9	6.0	55	58	100
1936	..	8	6.2	66	63	95
1937	..	9	7.5	70	68	97
1938	..	9	6.2	59	58	98
1939	..	9	6.4	68	68	100

*Source: Production data were derived from Statistical Yearbook of the League of Nations: 1920-1939 (Geneva: The League of Nations, 1921-1939); total cotton imports for 1922-1935 inclusive, International Trade Statistics: 1922-1935 (Geneva: The League of Nations, 1928, 1931-1936); and for 1936-1939, Canada Year Book: 1941 (Ottawa: King's Printer, 1941); imports from the United States from U. S. Bureau of Foreign and Domestic Commerce, Foreign Commerce and Navigation of the United States: 1920-1939 (Washington: Government Printing Office, 1921-1940).

TABLE 15

JAPAN: PRODUCTION AND IMPORTS OF TEXTILE FIBERS FOR THE PERIOD 1920-1939*

Year	Production (1,000 Metric Tons)				Imports		
	Flax	Hemp	Silk	Rayon	Cotton	Wool (1,000 Metric Tons)	Wool Yarn (1,000 Metric Tons)
				Filament Staple	Total (1,000 Metric Tons)	From U.S. (1,000 Metric Tons)	Percentage from U.S.
1920	..	..	22	.....	...	152	..
1921	..	..	23	.....	...	254	..
1922	72	93	24	0.1	523	136	26
1923	..	..	25	0.4	531	158	30
1924	..	..	28	0.9	487	156	32
1925	58	..	31	1.5	657	231	35
1926	55	93	34	2.3	699	290	41
1927	15	85	37	4.8	768	333	43
1928	23	89	40	7.6	586	291	50
1929	30	81	42	11.7	647	257	39
1930	27	86	43	16.3	574	213	37
1931	30	72	44	21.5	669	414	62
1932	20	83	42	31.6	764	535	70
1933	40	79	42	44.4	749	431	57
1934	51	77	45	70.4	813	411	51
1935	47	71	44	101.7	735	360	49
1936	46	79	42	125.3	913	320	35
1937	39	77	42	152.4	826	210	25
1938	88	89	43	95.5	563	242	43
1939	..	..	46	108.6	...	194	..

*Source: For production data, Statistical Yearbook of the League of Nations: 1920-1939 (Geneva: League of Nations, 1921-39); for imports from the United States, Bureau of Foreign and Domestic Commerce, Foreign Commerce and Navigation of the United States: 1920-1939 (Washington: Government Printing Office, 1921-40); for other imports, International Trade Statistics: 1920-1939 (Geneva: League of Nations, 1928, 1931-40).

TABLE 16

THE NETHERLANDS: PRODUCTION AND IMPORTS OF TEXTILE FABRICS
FOR THE PERIOD 1920-1939*

Year	Production (In 1,000 Metric Tons)			Cotton			Imports	Raw and Combed Wool (1,000 Metric Tons)	Cotton and Rayon Yarns (1,000 Metric Tons)
	Flax	Wool	Rayon Filament	Total (Raw and Waste in 1,000 Metric Tons)	From U.S. (Raw, in 1,000 Metric Tons)	Percentage from U.S.			
1920	...	...	....	..	20	..	..	...	..
1921	...	...	....	..	20	..	..	...	..
1922	20	...	1.1	41	22	54	54	...	48
1923	...	1.6	1.8	43	19	44	44	...	41
1924	...	1.9	1.5	35	28	80	80	...	49
1925	101	1.2	2.7	51	35	69	69	...	55
1926	105	1.2	4.5	53	30	57	57	6.3	51
1927	69	1.2	5.8	62	32	52	52	8.0	51
1928	139	1.2	6.8	59	39	66	66	8.5	61
1929	154	1.2	8.0	64	35	55	55	9.7	63
1930	104	1.1	8.0	60	33	55	55	11.8	54
1931	44	1.1	8.5	59	31	53	53	11.1	44
1932	15	1.1	9.0	41	34	84	84	10.1	40
1933	39	1.1	8.7	47	30	64	64	10.8	40
1934	54	1.3	10.0	57	19	33	33	9.5	40
1935	84	1.4	9.4	47	17	30	30	9.2	40
1936	122	1.3	9.5	56	16	29	29	9.5	43
1937	145	1.2	10.8	68	29	43	43	8.8	52
1938	195	1.3	9.0	58	20	34	34	12.3	47
1939	213	1.4	11.0	..	33	..	..	...	..

*Source: For production data, Statistical Yearbook of the League of Nations: 1920-1939 (Geneva: League of Nations, 1921-39); for imports from the United States, U.S. Bureau of Foreign and Domestic Commerce, Foreign Commerce and Navigation of the United States: 1920-1939 (Washington: Government Printing Office, 1921-40); for other imports, International Trade Statistics: 1920-1939 (Geneva: League of Nations, 1928, 1931-40).

TABLE 17

GERMANY: PRODUCTION AND IMPORTS OF TEXTILE FIBERS FOR THE PERIOD 1920-1939^a

Year	Production (In 1,000 Metric Tons)			Imports (In 1,000 Metric Tons)		
	Flax	Hemp	Wool	Rayon		Yarns
				Filament	Staple	
				Cotton		
				Total	From U.S.	Wool Cotton
1920	...	...	...	...	168	...
1921	...	...	...	...	341	...
1922	...	...	24	...	293	...
1923	...	...	26	...	...	16
1924	...	...	24	...	244	8
1925	...	...	20	...	333	23
1926	...	...	17	...	474	45
1927	...	...	16	...	379	63
1928	...	...	15	...	452	26
1929	...	...	15	...	378	18
1930	...	...	15	...	591	37
1931	...	...	15	...	463	65
1932	...	...	14	...	477	48
1933	...	...	14	...	394	28
1934	...	...	15	...	394	19
1935	...	...	16	...	325	16
1936	...	...	18	...	419	11
1937	...	...	20	...	396	15
1938	...	...	20	...	177	19
1939	...	...	21	...	399	10
	...	...	...	...	142	9
	...	...	...	...	325	10
	...	...	...	...	350	...
	...	...	...	...	78	20
	...	...	...	...	42	21
	...	...	...	...	...	...

^aSource: For production, Statistical Yearbook of the League of Nations: 1920-1939 (Geneva: League of Nations, 1921-39); for raw-cotton imports from the United States, U.S. Bureau of Foreign and Domestic Commerce, Foreign Commerce and Navigation of the United States: 1920-1939 (Washington: Government Printing Office, 1921-40); for total raw cotton imports, Statistisches Jahrbuch für das Deutsche Reich: 1939 (Berlin: Paul Schmidt, 1939); for other imports, International Trade Statistics: 1920-1939 (Geneva: League of Nations, 1928, 1931-40),

^bIncludes rayon and silk yarns.

TABLE 18

GERMANY: PERCENTAGE OF RAW COTTON IMPORTS FROM PRINCIPAL COUNTRIES OF ORIGIN
FOR THE YEARS 1923-1937*

Year	Egypt	India	U.S.A.	Turkey	Brazil	Argentina	Peru	Mexico	China
1923	5	14	68	.	..	.	.	.	2
1924	6	11	73	.	..	.	.	.	1
1925	4	11	75	.	..	.	.	.	.
1926	4	8	79	.	..	.	.	.	1
1927	4	6	79	.	..	.	.	.	.
1928	4	10	73	.	..	.	.	.	.
1929	5	12	73	.	..	.	.	.	.
1930	6	13	68	1	1	.	1	.	.
1931	8	10	68	.	1	.	2	.	.
1932	8	6	75	.	..	.	2	.	.
1933	8	8	72	.	..	1	2	.	.
1934	11	9	55	2	2	1	2	.	.
1935	10	8	27	4	21	2	3	1	.
1936	9	12	36	5	12	4	6	3	.
1937	12	11	34	2	20	2	5	2	.

*Source: Statistisches Jahrbuch für das Deutsche Reich: 1937 (Berlin: Paul Schmidt, 1937).

TABLE 19

UNITED KINGDOM: PRODUCTION AND IMPORTS OF
TEXTILE FIBERS FOR THE YEARS 1920-1939*

Year	Production (In 1,000 Metric Tons)					Imports		
	Rayon				Total (1,000 Metric Tons)	Cotton		Wool (1,000 Metric Tons)
	Flax	Wool	Filament	Staple		From U.S. (1,000 Metric Tons)	Percent- age from U.S.	
1920	..	..	..	..	..	589	..	..
1921	..	..	..	..	..	384	..	..
1922	69	..	7	..	665	428	64	535
1923	..	40	8	..	606	369	61	372
1924	..	41	11	..	728	459	63	397
1925	59	47	14	..	875	567	65	369
1926	61	50	12	..	804	539	67	401
1927	51	52	18	..	731	393	54	405
1928	59	52	24	..	700	468	67	381
1929	70	51	24	1.2	719	361	50	399
1930	54	50	21	0.3	569	284	50	388
1931	14	51	24	0.4	515	213	41	410
1932	12	54	32	0.6	592	354	60	429
1933	22	54	36	1.1	664	354	53	455
1934	37	52	40	1.1	604	212	35	375
1935	70	49	51	4.2	612	281	46	404
1936	51	49	53	11.9	701	288	41	415
1937	43	49	54	14.8	753	362	48	355
1938	41	50	48	14.4	547	194	36	400
1939	..	..	55	27.2	..	265	..	..

*Source: For production, Statistical Yearbook of the League of Nations: 1920-1939 (Geneva: League of Nations, 1921-39); for imports from the United States, U.S. Bureau of Foreign and Domestic Commerce, Foreign Commerce and Navigation of the United States: 1920-1939 (Washington: Government Printing Office, 1921-40); for other imports between 1922 and 1935 inclusive, International Trade Statistics: 1922-1935 (Geneva: League of Nations, 1928, 1931-36); and for the period 1936-38 inclusive, Statistical Abstract for the United Kingdom, 1924-1938 (London, 1940).

TABLE 20

UNITED KINGDOM: PERCENTAGE OF RAW COTTON IMPORTS FROM
PRINCIPAL COUNTRIES OF ORIGIN FOR VARIOUS YEARS 1929-1937*

Source	Per Cent of Total Raw Cotton Imports			
	1929	1933	1935	1937
United States	54.3	53.8	44.7	46.1
Egypt	19.2	22.8	21.4	17.5
India	6.9	7.8	13.0	13.9
Peru	5.3	5.7	5.4	5.6
Brazil	4.3	1.0	4.7	6.5
Anglo-Egyptian Sudan	4.0	3.2	4.3	4.8

*Source: World Trade in Agricultural Products (Rome: International Institute of Agriculture, 1940), p. 411.

TABLE 21

ITALY: PRODUCTION AND IMPORTS OF TEXTILE FIBERS FOR THE YEARS 1920-1939*

Year	Production (In 1,000 Metric Tons)					Imports		
	Flax	Hemp	Wool	Silk	Cotton	Rayon		Cotton
						Filament	Staple	
					Total (1,000 Metric Tons)		From U.S. (1,000 Metric Tons)	Percentage from U.S. Tons)
1920	..	.....	..	3	..	..	128	..
1921	..	.....	..	3	..	..	126	..
1922	22	731	27	4	10	3	133	41
1923	..	.....	16	5	..	5	178	38
1924	..	.....	16	5	..	11	185	68
1925	26	1,239	16	4	..	14	201	39
1926	25	1,212	15	4	10	17	237	72
1927	21	830	15	5	..	24	239	81
1928	23	857	24	5	..	26	158	76
1929	33	897	23	5	7	32	175	75
1930	25	914	22	5	10	30	184	75
1931	22	536	20	3	3	34	127	62
1932	22	553	19	4	2	28	126	74
1933	18	588	19	3	3	33	169	89
1934	19	629	16	2	9	5	193	88
1935	20	664	14	2	8	10	118	67
1936	32	873	14	3	21	31	108	72
1937	28	1,121	13	3	42	50	81	53
1938	33	1,170	15	2	75	71	126	19
1939	59	1,200	16	3	75	87	91	35
					..	54	89	..

*Source: For production, Statistical Yearbook of the League of Nations, 1920-1939 (Geneva: League of Nations, 1921-39); data on the wool clip was found to be inconsistent in the several annual publications. For imports from the United States, U.S. Bureau of Foreign and Domestic Commerce, Foreign Commerce and Navigation of the United States: 1920-1939 (Washington: Government Printing Office, 1921-40); for other imports, International Trade Statistics: 1920-1939 (Geneva: League of Nations, 1928, 1931-40).

TABLE 22

THE PERCENTAGE OF RAW COTTON IMPORTS DERIVED FROM THE UNITED STATES
BY TEN FOREIGN NATIONS, 1922-1939

Year	Sweden	Canada	Japan	Netherlands	Germany	Spain	United Kingdom	Italy	France	Belgium
1922	78	83	26	54	68	96	64	73	75	75
1923	84	100	30	44	73	49	61	69	62	60
1924	76	83	32	80	75	73	63	72	64	53
1925	65	90	35	69	79	82	65	81	66	55
1926	57	100	41	57	79	88	67	76	64	71
1927	50	100	43	52	79	77	54	75	64	55
1928	45	87	50	66	73	100	67	75	57	43
1929	48	100	39	55	73	84	50	75	57	41
1930	38	100	37	55	73	60	50	62	57	34
1931	38	93	62	53	68	62	41	74	43	37
1932	53	98	70	84	75	75	60	88	76	48
1933	61	94	57	64	72	77	53	88	56	37
1934	54	91	51	33	55	59	33	63	41	22
1935	57	100	49	30	27	60	46	72	54	35
1936	..	95	35	29	36	...	41	80	..	..
1937	..	97	25	43	34	...	48	76	..	..
1938	..	98	43	34	..	...	36	58	..	..
1939	..	100	..	..	..	...	..	..	..	..

TABLE 23

PERCENTAGE OF THE ANNUAL AMERICAN COTTON CROP OF VARIOUS
STAPLE LENGTHS, 1930-1939*

Crop Year	Staple Length (In Inches)							
	Under 7/8	7/8 to 29/32	15/16 to 31/32	1 to 1-1/32	1-1/16 to 1-3/32	1-1/8 to 1-5/32	1-3/16 to 1-7/32	1-1/4 and over
1930	12	39	25	13	7	4	0.4	0.2
1931	6	39	27	15	7	4	1.0	0.2
1932	7	38	29	14	7	4	0.7	0.2
1933	4	36	32	16	6	5	1.0	0.2
1934	8	37	22	15	8	7	1.0	0.1
1935	13	31	25	16	8	5	1.0	0.2
1936	10	26	22	23	13	6	0.6	0.2
1937	10	29	27	19	9	5	1.0	0.4
1938	4	17	27	26	17	7	1.0	0.4
1939	5	21	24	29	15	4	0.7	0.3

*Source: U. S. Department of Agriculture, Agricultural Statistics: 1941 (Washington: Government Printing Office, 1941), p. 128. Percentages calculated by the writer.

TABLE 24

EFFECT OF THE FEDERAL CROP LOAN PROGRAM ON FARM
PRICE AND CARRY-OVER, 1932-1939*

Year	Farm Price (Cents)	Loan Price (Cents)	Volume under Loan (Bales)	Carry-over Beginning of Season (1,000 Bales)
1932..	6.52	....	.....	9,678
1933..	10.17	10.0	1,926,000	8,165
1934..	12.36	12.0	4,632,000	7,744
1935..	11.09	10.0	115,000	7,208
1936..	12.33	....	.....	5,409
1937..	8.41	8.4	5,581,000	4,499
1938..	8.60	9.0	4,482,000	11,533
1939..	9.09	8.8	25,000	13,033

*Source: For carry-over and farm prices, see U.S. Department of Agriculture, Agricultural Statistics: 1941 (Washington: Government Printing Office, 1941), pp. 123, 131. For loan data see The Agricultural Situation (Washington: Government Printing Office, May, 1940), p. 17.

TABLE 25

RELATION BETWEEN THE PRICES OF AMERICAN AND
FOREIGN COTTON DELIVERED IN THE LIVERPOOL
MARKET, 1926-1939*

Liverpool Price of Selected Foreign Cotton as a Percentage of the Liverpool Price of American 7/8-Inch Cotton				
Year	Indian Oommar No. 1 Fine	Egyptian Uppers Fully Good Fair	Brazilian São Paulo Fair	Peruvian Tanguis Good
1926 ..	79	125	99	114
1927 ..	70	116	95	122
1928 ..	77	127	99	138
1929 ..	74	119	97	125
1930 ..	80	115	100	117
1931 ..	76	109	97	113
1932 ..	75	110	98	121
1933 ..	86	125	101	124
1934 ..	90	118	99	128
1935 ..	71	120	98	119
1936 ..	70	115	94	115
1937 ..	76	115	97	116
1938 ..	82	131	96	112
1939 ..	88	142	91	122

*Source: U.S. Department of Agriculture, Agricultural Statistics: 1936, 1941 (Washington: Government Printing Office, 1936, 1941). Percentages calculated by the writer.

TABLE 26

PRICE RELATIVES OF AMERICAN AND FOREIGN
COTTON TYPES IN THE LIVERPOOL
MARKET, 1930-1939*

Year	Price Relatives of Selected Cotton Types 1926-1929 = 100				
	American 7/8 Inch	Indian Omra No. 1, Fine	Egyptian Uppers Fully Good Fair	Brazilian São Paulo Fair	Peruvian Tanguis Good
1930 ...	59	52	56	61	60
1931 ...	38	48	36	40	42
1932 ...	43	47	43	46	46
1933 ...	63	60	56	66	66
1934 ...	72	69	63	74	71
1935 ...	68	69	63	72	69
1936 ...	74	70	70	76	80
1937 ...	52	51	53	54	62
1938 ...	51	46	48	52	54
1939 ...	64	64	64	67	63

*Source: Adapted by the writer from U.S. Department of Agriculture, Agricultural Statistics: 1936, 1941 (Washington: Government Printing Office, 1936, 1941). Liverpool delivered prices in cents per pound.

TABLE 27

SECTION 32 FUNDS EXPENDED ON COTTON
IN THE FISCAL YEARS 1939-1941^a

Program	1939	1940	1941
Miscellaneous new uses ^b ...	\$ 244,234	.....	.....
Cotton bagging (for cotton bales)	223,787	\$ 312,260	\$ 311,319
Cotton bags	17,451	.....	.....
Cotton and cotton fabrics .	855,793	9,296,722	.....
Cotton fabrics and blankets	.....	3,708,809	.....
Cotton paper program .....	.....	33,426	102,549
Cotton insulation program .	.....	30,000	300,000
Cotton Variety Improvement ^c	17,124	46,590	455,873
Cotton, raw, for ticking and comforter covering	.....	.....	27,105,004
Cotton Stamps (brown) .....	.....	120,094	2,284,651
Export program: ^d			
Raw cotton .....	.....	35,783,065	.....
Cotton products .....	.....	1,827,268	7,403,851
Total	\$1,358,389	\$51,158,234	\$37,963,247 ^e

^aSource: Surplus Marketing Administration, personal letter, August 27, 1941.

^bIncludes ditch linings, blue-mold control in tobacco seed beds, beehive covers, fruit-drying uses, mulching-tree seedlings, and airport runways.

^cPayment for the export of cotton produced in approved one-variety areas.

^dIncludes some section 12 funds.

^eExcludes expenditures in connection with the Supplementary Cotton Program.

TABLE 28

ESTIMATED ANNUAL EXPENDITURE FOR COTTON GOODS BY NON-RELIEF FAMILIES
FOR THE YEAR 1935-1936*

Income Group	Clothing				Household Goods	Total
	Husband	Wife	Boy 6-11 Years	Girl 6-11 Years		
Under \$500	\$ 5.65	\$ 3.50	\$ 4.17	\$ 2.94	\$ 1.64	\$ 17.90
\$ 500 to \$1,000	8.57	4.86	5.96	4.65	3.33	27.37
1,000 to 1,500	10.84	6.24	7.41	6.56	5.68	36.73
1,500 to 2,000	12.80	7.45	8.75	8.30	7.08	44.38
2,000 to 3,000	15.47	9.13	10.50	10.44	10.01	55.55
3,000 to 5,000	20.19	11.61	13.33	13.59	14.85	73.57
5,000 and over	31.79	17.29	17.11	16.83	28.94	111.96

* Source: Federal Surplus Commodities Corporation, Can We Use Our Cotton at Home? (Washington: Government Printing Office, June, 1940), p. 9. Estimates were prepared by the Marketing Section, United States Department of Agriculture, and were based upon the records of the Consumer Purchases Study.

